



Motor Age

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JULY 24, 1902

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Motor Age

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VOL. II. No. 4.

CHICAGO, JULY 24, 1902.

\$2.00 PER YEAR

LESSONS OF THE RACE FROM PARIS TO VIENNA

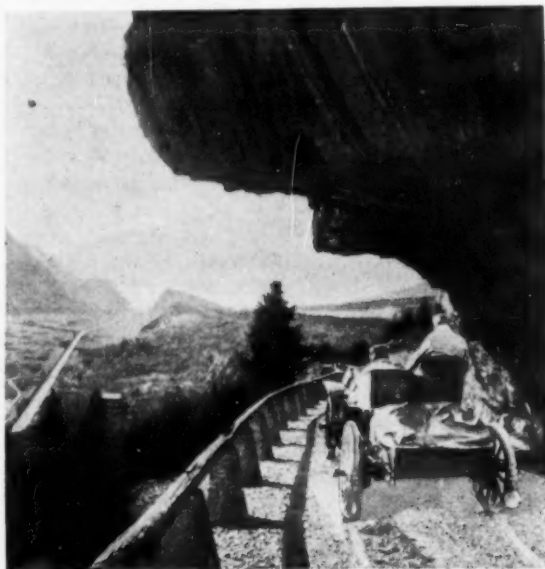
From a mass of interesting matter furnished by the European motor press the following facts and conclusions have been extracted, as bearing interestingly on the necessities of construction of vehicles combining speed with durability. The British press, particularly, is satisfied that the French makers sacrificed too much to speed, but for this, perhaps, some allowances should be made because of the success of the Napier in the cup race, that machine having been prepared with a view to stability rather than great speed.

If it is difficult, says the Autocar, to follow the incidents of a race in which nearly 150 vehicles are competing, it is still more puzzling to separate the wheat from the chaff in the crop of rumors that are constantly coming through. A competitor sees or hears something which he does not quite grasp during his rapid flight through the country, and imagination does the rest, transforming incidents into accidents, and accidents into catastrophes, until the spectators at the controls begin to think that the situation is getting serious. It was stated positively that a Gobron-Brillie car had been smashed up and the driver killed, but later on Madame Gobron, who was in the special train, declared that, though the driver was hurt, his injuries were by no means serious. We saw a Peugeot on a railway truck at Bregenz, and a porter gave circumstantial details of how Caillois had been killed, but

it turned out afterward that rumor had again proved a lying jade. As a matter of fact the only victim appears to have been Baron Henri de Rothchild's driver, who was not racing at all.

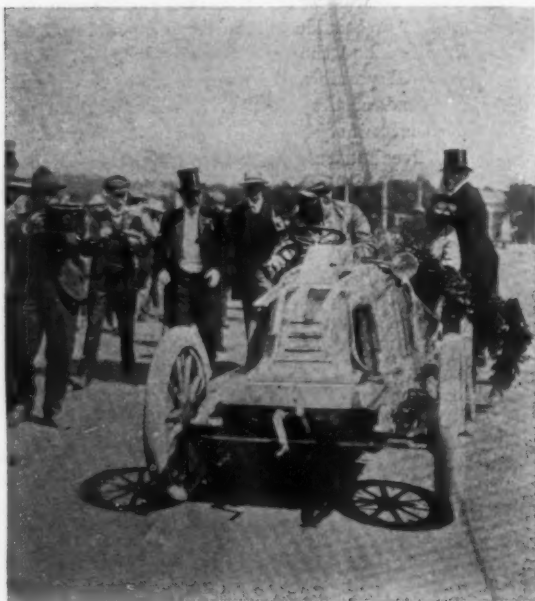
And what about the Gordon Bennett cup? To tell the truth, no one seemed to have much doubt concerning the issue, and it was regarded as a foregone conclusion that with such a considerable advance upon the Napier the big Panhard had the trophy safely in hand. An accident was still possible, but hardly probable, when so near to the end of the journey. Then telegrams came in stating that ninety-five cars had left Bregenz, and that eighty-five had safely crossed the Arlberg. From Telfs there came a list of arrivals with the announcement that Chevalier Rene de Knyff had not been signalled. The French visitors began to get nervous.

Other telegrams were eagerly scanned, but still there was no sign of M. de Knyff, and it was learned afterwards that his differential had broken when about twenty miles from Innsbruck. Meanwhile, Mr. Edge was still running, and the fear became a certainty when he was signalled as arriving at Innsbruck. The interest in the race was entirely forgotten in the discussion that was carried on over what the French regarded as a sort of calamity. The whole blame was laid on the Automobile Club de France for having chosen men instead of vehicles, and it was said to be highly imprudent to let



One of the Dangers of the Paris-Vienna Route.

the defenders drive new cars which had never been tested, and had not previously taken part in a race, and it was forgotten that the Napier was also untried. This discussion may be left to the French makers themselves, but it seems to be pretty clear that different arrangements will be carried out in the future, when the A. C. F. will select vehicles to challenge for the cup, instead of simply appointing men, who are allowed to drive what cars they please. The French will make tremendous efforts to get the cup back. One prominent maker informed us that it was a real disaster for the French industry, since it would mean the loss of a considerable amount of business, and when we pointed out that it was good for sport and would give additional interest to the race next year, he inquired if the race would be run off in England? This is the question which is most concerning the trade at the moment. Under the rules the cup must be run for in the country which holds it, and as racing is prohibited in England there must be one of two things, either get special permission to race for the cup in England or else modify the rules to allow of its being run for on the continent. Of course, the rules cannot be changed without the consent of the Automobile Club of Great Britain and Ireland, but there can naturally be no question that the club will do what it can



Renault, Shortly After His Arrival at Vienna.

to facilitate the organizing of a race abroad if it cannot possibly be done in England. Meanwhile, the French recognize that the success of the Napier will give an enormous stimulus to the English industry, and as the English makers will do their best to keep the trophy, it will mean a very keen struggle next year.

We interviewed Mr. Edge on his arrival in Salzburg, and he told a very exciting story of the run. In entering for the Gordon Bennett cup he had little idea

of winning the trophy, for, being so much lower powered than the French vehicles, he never expected to beat them in point of speed. He ran for the sake of getting experience and acquiring hints and ideas for improving the Napiers, so that they would eventually be able to show a decided superiority over the foreign cars. As he had won the cup because the other competitors had one by one broken down, we pointed out that this was of itself a proof of the superiority of the Napier under the special conditions of the race. If the French cars collapsed on the abominable Tyrol roads, and even on the course between Champigny and Belfort, it was because the makers had sacrificed all-round strength to engine power, and they knew very well that they were running a considerable risk. If they preferred to take this risk they had no one to blame but themselves. It was a battle between power and reliability, and as the latter quality came out victorious there can be no doubt that the best car won.

Mr. Edge saw many a wreck by the wayside, and when he had left the Arlberg he passed a Peugeot smashed up, with the driver lying down looking very bad indeed. Mr. Edge had little hope now of winning the cup. He passed Chevalier de Knyff in trouble, and asked him if the race was over, and, evidently misunderstanding the question, M. de Knyff answered in the affirmative.

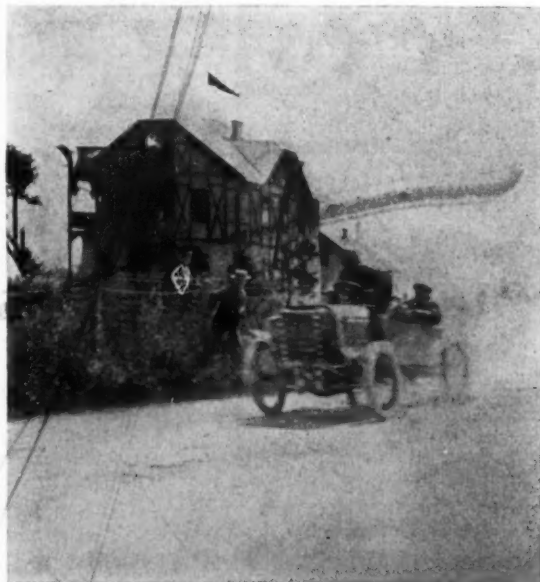
The incidents of the race were pieced together afterwards from the stories of eye-witnesses, though a good deal of picturesque exaggeration had to be cut away to get at the true history of this marvelous ride. Baras, who was driving a Darracq with alcohol, related that another Darracq vehicle had fallen down a precipice for a distance of 800 feet without injuring the driver or his mechanism. This was perfectly true in a sense, but it was only half the truth. While descending the Arlberg the steering gear of the Darracq refused to act and the car ran off the road, and at the same time the cylindrical tank on which the Austrian driver, Max, was sitting broke away, throwing both men on to the road. The car dropped down the side, and was stopped by a ridge 100 feet below, while the tank went rattling and bounding to the bottom. Max let himself down to see the vehicle, which was an absolute wreck, and as he was climbing up Baras passed by, and was able to tell a wonderful story at the control. Still more wonderful was the feat accomplished by Louis Renault. He was at the Innsbruck control with four other cars waiting for their turn to be sent off when Baron de Caters came up at full speed on his Mors, and in trying to pass in the narrow road broke the offside wheels of the Renault car. To most other competitors the case would have been hopeless, but M. Renault immediately set about repairing his wheels. He found some dry wood and cut out the spokes with a knife, making such a fine job of it that he was able to get to Vienna without trouble, and, had the spokes been painted, it would really have been difficult to see that a repair had been carried out at all.

The success of the Mercedes was the more remarkable as they were not built specially for the race, but were

driven by private owners, and were of the same type as those which made their first appearance down at Nice. They were, of course, much lower powered than the big French vehicles, and it is no doubt on account of this that they did so well on the Tyrol roads. As the strength was not sacrificed to power to the same extent, they showed much greater resistance, and got through to Salzburg without any trouble. The practical character of the car got the better of the theoretical application of high powers to the big French vehicles.

Altogether, the results of the race may be regarded as highly satisfactory, for about seventy vehicles and cycles succeeded in arriving in Vienna, or more than half the number starting from Champigny. This is a much higher proportion than could have been expected in view of the character of the Austrian roads, and shows that, though the new French powerful cars did less than was anticipated, they were by no means a failure, and the fact that the vehicles were able to come through such an ordeal proves that the French makers have accomplished a wonderful feat in building high-powered cars to resist such strains. The most conspicuous failures were the Gordon Bennett cup cars, which were put out of the race by the breaking of gears. At the same time the race has certainly shown that these high powers in lightly built carriages are a mistake for bad roads, and, all things considered, the Mercedes did a better performance than the French vehicles, and they narrowly missed taking the two first places in the 1,000 kilogs. category, for Baron de Forest would have run the winner very close had he not lost a couple of hours on the first stage and broken his petrol tank near Vienna. The feature of the race, however, was the behavior of the light carriages. They showed up extremely well on the mountain roads, and, on the whole, ran with much greater regularity than the majority of the big cars. The performance of the Renault was a revelation, and again classed it as the fastest and most reliable of its type. The motor is a four-cylinder engine of 16 nominal horsepower, but developing something like 22 horsepower. It is a new motor constructed by Renault Freres, who have put the usual conscientious work into it which is the great secret of their success. With the exception of one, which came to grief on the Arlberg, all the Darracqs covered the entire course in creditable times, and all four Serpollet vehicles reached Vienna, thus confirming the reliability which they showed in the Northern Alcohol Circuit. The Clements also performed satisfactorily, and the Gobron-Brillie-Nagants should not be overlooked, for, though making no pretence at high speed, they went over the whole course with great regularity. What this proportion of more than 50 per cent of successes means can only be appreciated by an inspection of the cars when they were put on exhibition in the Rotunde. There was scarcely one which had come out of the ordeal unscathed. They all wore a very battered look; some of them with the bonnets tied on with rope and others with parts of the carriage work smashed away and springs broken. The mechanism must be of very solid construc-

tion to stand such strains. And yet while gears have broken we have not heard of a single instance of a motor failing, and the powerful Centaur engines on the Panhard cars do not seem to have given the slightest trouble. If these big vehicles did not break records on the Austrian roads, the experience in their construction has



De Knyff at Full Speed on the Salzburg Road.

certainly not been lost, and it has resulted in the designing of much lighter and more efficient motors than would probably have been possible if makers had not set themselves the task of employing the maximum of power for the weight allotted to them. At the same time the French manufacturers have had enough of this kind of racing for the moment. It was more than they expected. They think that the test was not a fair one, and they are probably right, but almost before they have finished protesting that they will never race again in foreign countries they are talking of organizing the next race from Paris to St. Petersburg. Racing is such a big factor in the automobile industry that even those who calculate the huge expense and dread the fatigue and intense mental strain see that they cannot do without it.

French Say They Were Misled

Paris, July 10.—The prevailing opinions of Paris-Vienna in the French motor world, either sportive or industrial, seems to be that a huge misunderstanding was underlying the bottom of the whole affair. Paris-Vienna was advertised as a race pure and simple, and in a race speed is the essential factor of success. Paris-Vienna turned out an endurance test in the narrowest sense of the word, at least for three parts of it, and in such a test speed capacities counted for little, compared with robustness. The foreign competitors were fully aware of the fact, but not so with the French, whose vehicles were altogether too fast for the course and work.

The slow pace rendered necessary by the condition of the roads, put a strain on their organs greater than would have done a higher rate of speed. No doubt they led in the end, but came very near losing to the Austrian brigade, for hadn't Baron Zborowski made a mistake in Switzerland which forced the judge to penalize him, he would have been first in the most important class.

The French were taken by surprise, so to speak. They

might have held the lead, as they did, they certainly would not have been able to do so on the detestable roads of part of Switzerland and Austria, as these German machines are built for the purpose of going through such rough country and are tested on them. The Daimler-Mercedes people probably do not care about what we say, for they have orders ahead for many years, but we think that they ought to have a little of that old and



EXTERIOR AND INTERIOR VIEWS OF MAURICE FARMAN'S GARAGE

never realized, except too late, what was in store for them, otherwise they would have placed different vehicles in the field. The lesson will serve them. They will make sure another time beforehand that the race whatever it is, answers the definitions of a race.

On the whole the result must be voted highly satisfactory, since out of 137 cars that started on that terrific journey eighty finished. That says much of the progress of the automobile all around.

German View of the Event

Although the Paris-Vienna race may now be considered an old story there is much talk about it in Europe. This especially is the case in Germany where the automobile papers vehemently denounced the Daimler-Mercedes concern for not having tried, in every possible way, to capture the event. One of the papers says: "The French victory should be a good lesson for our makers. We hope they will follow the process of our French neighbors by widely advertising their wares, by making an effort to break records, by sending their machines to other countries to compete, to open their eyes and see what others do in general, and by taking more interest in their goods with regard to the foreigner than they do at present. It is an erroneous idea to keep yourself closed up all the time and think that what the other fellow does or has is of no use to you. To think that two amateurs, one of whom had never taken part in a road race, while the other was very little better, finished among the first of such a long and hard race is pleasing and heart breaking at the same time, because we are of the opinion that, had the Daimler people entered this event like some of their French competitors there is no doubt that they would have finished in great style, for the simple reason that while on French roads the French machines

well known German patriotic spirit and seen to it that this event should have turned out as a German victory."

Hard Climbing in the Adirondacks

Capt. Herbert H. Sackett, of Buffalo, has been operating an automobile in the Adirondacks. From the description furnished the machine appears to have been a Pierce. Captain Sackett and his wife first attempted the ascent of Mount Pisgah, which rises 600 feet above the Saranac river on the edge of Saranac Lake village, and is reached by a sharply inclining road about a mile long. The road is in very poor condition, having been in disuse for 20 years. This was probably the first vehicle that had gone over it in at least 15 years. The top of the mountain was reached without mishap. A feature of the undertaking was the number of runaways caused. The horses were quite unused to a horseless vehicle. Some effort was made to prevent Captain Sackett from using his machine owing to the number of runaways, but the authorities took no action in the matter.

Rural Mail Delivery by Automobile

A report from Hagerstown, Md., says that the postmaster general has issued a special credit authority to Oscar Werking to use an automobile in making his daily delivery. According to the official document Mr. Werking is the only rural route agent who regularly uses an automobile in his work. Last November the rural delivery was established and Werking was given a route 32 miles long. He had a horse but when the winter rains made the roads heavy it was found to be all but impossible to urge the horse over the long route

every day. Occasionally another horse was used for a few trips and once in a while Mr. Werking would go over the route on his bicycle. He continued to make the deliveries in that manner until a few weeks ago, when he determined to invest in an automobile. The experiment has proved successful and apparently the use of the machine is a more economical method than the former one of delivering mail over country roads.

Club Runs Risk of Bankruptcy

The Lenox Club, representing the cottagers at Lenox, Mass., has issued a circular which says that "a feeling of general apprehension is prevalent and the result is that in the case of a large number the use of the highways for ordinary driving has become so dangerous as to be practically forbidden. Under the circumstances the club declares that for all violations of the existing Massachusetts statutes there should be the most vigorous prosecution, and that for violation of the statutes in Lenox from this time until October 30, the club will pay a reward of \$25 to each person securing a conviction." This circular is signed by the governor of the club, Capt. J. S. Barnes, J. W. Burden, G. G. Haven, J. E. Parsons and Charles Lanier of New York, H. C. Haven of Stockbridge and Thomas Post of Lenox.

Insurance Men Are Shy

Cleveland, O., July 22.—Insurance people have decided that automobiles are "poor risk," and the majority of concerns represented in Cleveland are refusing to insure them except under specific stipulations that guarantee the machines' safety only when they are standing unused in the barn. The cause of this developed in this city two weeks ago when a machine caught fire while speeding down Euclid avenue and was damaged to the amount of \$250. The company which wrote the insurance was compelled to cancel it as the home company will not take any more.

Said a member of the firm:

"We find that the repair shop people were inclined to hold us up. A man usually wants his machine in a hurry and turns on his gasoline full force. The fuel blazes up and more damage can be done in 3 minutes to the gearing and trimmings than a blaze of a quarter of an hour will do to a residence. It costs \$50 to revarnish an automobile and the leather trimmings on the average machine represent another \$100. The rate we made was \$25 per thousand and one experience was enough to convince us that the business was not desirable. Auto insurance is a thing of the past except when the machine is standing."

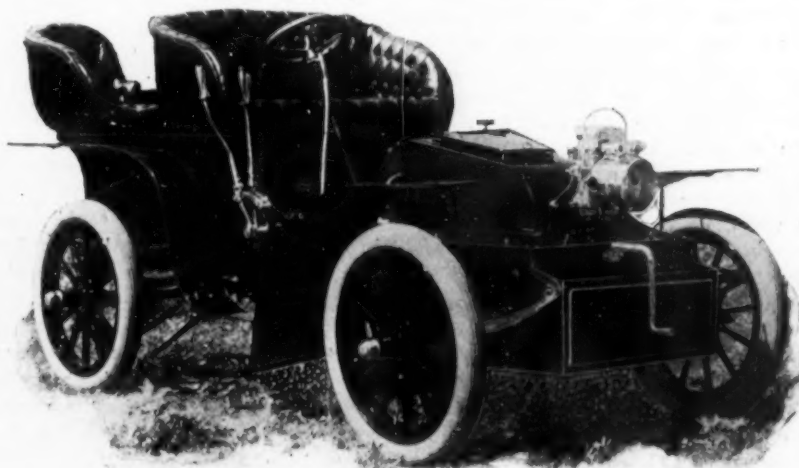
Date of New York-Boston Test

New York, July 21.—The A. C. A. endurance run committee will probably meet early this week and decide on the date of the Boston-New York test. October is the time most favorably mentioned. A MOTOR AGE man just returned from New England reports great interest in the run among the clubs in the cities through which the vehicles will pass. A succession of entertainments en route seems likely.

It is reported that signs announcing that automobiles are not allowed on the grounds have been posted at John D. Rockefeller's country home, at Pocantico Hills, N. Y. There are 50 miles of private driveways on the grounds, many of them along steep embankments. Frightened horses are said to have been responsible for the ruling.

Rigal, the French motor cyclist, has modest ideas of speed. He has expressed a willingness to race any competitor on any English or French track on which it is possible to travel at a speed of 65 miles an hour.

Alden L. McMurtry of the Adams-McMurtry Co., of New York, was among the London visitors recently. It was his intention to visit France and Germany before returning.



THE TOLEDO GASOLINE TOURING CAR.

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THE MARCH OF IMPROVEMENT.

About a year ago announcement was made by the French race promoting club that a limit would be placed on the weight of racing cars. The result was that makers devoted attention to reducing weight without decreasing power, and although it cannot be truly claimed that the high-powered cars of this year made as favorable a showing as last in the matter of speed over the entire journey they did wonders, all things considered and probably would have equalled last year's average had the road been as good as that from Paris to Berlin.

And now, apparently, we are on the eve of another decree of fashion which means, also, improvement, for it is calculated to increase the comfort of the tourist and decrease the labor of the owner or chauffeur. There is a growing tendency among European builders, and particularly among those of France, to make a typical style of running gear, which, varying in dimensions, style of motor, general arrangement of speed transmission, etc., at the inclination of the maker, shall preserve certain features in all vehicles, no matter by whom made. The chief points are that nothing shall project above the top of the running gear behind the dash, except the steering wheel, or within the limits of the body. The dash and motor-bonnet and the brackets for the controlling and brake levers must be an integral part of the running gear, and the levers themselves must be located outside of the body. No wiring or attachments of any kind must be connected with the body.

The advantages are obvious. The construction is simplified and eliminates a number of objectionable points heretofore common. The entire body space is given up to the passengers and baggage. The body can be almost instantly removed for inspection of the machinery, and the vehicle can be converted, in a few

minutes, from a touring or pleasure car to a racing machine. These are points worthy of consideration by American manufacturers. There are many machines made in which not only a part of the machinery, but the gasoline and water tanks, batteries, etc., are all above the line of the top of the running gear, and to separate some of which from the body is about half a day's work.

SINGLE CYCLE AND TWO CYCLE.

Why "two cycle" and "four cycle," as applied to a motor? Why not "single cycle" and "two cycle," as used in England? The questions are by no means new, but are none the less pertinent for that. In the automobile business, where many people of comparatively little learning in mechanical matters have to deal with terms which, until now, have been strange to them, it is desirable that the language used be as nearly descriptive as possible. The terms quoted are ambiguous, to say the least. Why they are used is inexplicable. According to the best encyclopaedic authorities a "cycle" may be defined as "a series of events or happenings which recur in regular succession at stated periods of time." In so-called two or four cycle engines the operation, during each successive stroke of the piston, is not completed within itself, but is dependent on one or more conjunctive strokes to complete the "event or happening," or, in other words, the cycle of events. It is impossible, therefore, to describe the movement of the piston, backward or forward, as a cycle. In the one case it is only half a cycle and in the other a quarter and hence it is not entitled to the dignity commonly but erroneously applied to it. It would be more nearly correct to indicate the type of engine by the number of revolutions of the crank shaft and fly-wheel as, for example, one revolution cycle engine or two revolution cycle engine. This might, for convenience, be abbreviated to one and two cycle engine respectively.

INLET VALVES OF GASOLINE MOTORS.

During a recent discussion in which several tradesmen expressed their opinions freely as to the merits of flat and bevel seated admission or inlet valves for gasoline motors, an interesting incident was related which shows how readily, in these early days of the industry, a man may fall from grace or achieve a reputation by an event of minor importance. The foreman of a machine shop, it appears, had built a gasoline motor, not of his own invention, but, so far as he could ascertain facts, similar in stroke, bore and general dimensions to a previously existing motor of known power and speed. All went well. The workmanship was everything that could be desired, the compression right, and everything else in first-class order. But when the motor was started on its initial trip it failed to develop anywhere near the horsepower expected. Experiments produced no beneficial results and at last, in desperation, the builder resigned his position.

The matter was then taken in hand by a young man of some technical ability, who found that when the

motor was running at its proper stroke the admission valve choked the supply of mixture. He was of French extraction and possessed of French ideas. He blamed the design of the valves, and as they were in the cylinder head a new head was made, with flat-seated admission valve instead of the bevel-seated type originally used. All this, of course, at considerable expense and loss of time. But when the change had been completed the motor ran satisfactorily and the young man became the "real thing" in that shop.

Now the fact is that as the size of the inlet valve opening was not enlarged by the change, only one thing, trifling in manufacture but all important in result, was wrong: The inlet valve had not sufficient lift to allow a full charge to enter the cylinder when the motor was running at its rated speed. A new cylinder head and valve mechanism was unnecessary. The matter could have been easily and simply remedied by making a new cam and increasing the lift of the valve.

A flat-seat valve requires one-quarter of the diameter of its opening for a full and unobstructed passage, while a bevel-seat valve with the 45 degree angle, commonly used, requires approximately three-eighths of the diameter of its opening. If the foreman had been aware of these simple facts he could have made a new cam with 50 per cent greater rise and have retained his position. The other fellow would not be enjoying glory to which his attainments do not entitle him. On such small incidents are many successes and failures in the industry dependent.

The Education of the Horse

The following suggestions are extracted from a circular lately issued by the Automobile Club of America:

On meeting a horse if he throws up his head suddenly and puts his ears forward, he is frightened and will probably shy. If the driver of an automobile would stop and if the horse continues to be frightened will stop his motor, the horse can be driven past it. The driver of an automobile if there is difficulty in getting a horse to go by, should lead the horse past. In doing this the man leading the horse should stand between the automobile and the horse. When a horse is shying away from an object it is much easier to hold him if he is shying away from you than when he is shying towards you. The occupant of the automobile should call out to the horse when he is passing a vehicle, saying, "whoa," etc., in a loud voice.

Horses that are used in or about large cities, and in towns where there are trolley roads, are but little frightened by automobiles. When, however, a horse unaccustomed to automobiles meets one in a quiet country road he is frequently frightened.

The following method of training horses has been proven very successful. Select a small square where the road is wide, or a mile of wide road where there are no ditches. Have the horse or horses to be trained driven 5 or 6 miles sharply before the lesson begins. A well fed animal just taken from the stable is apt to cut up on the least provocation. The horse to be trained, if possible should be harnessed alongside of a horse that is accustomed to automobiles. If this cannot be done he

should be driven. It has not been found satisfactory to lead or ride a horse in breaking him in to an automobile.

Send the automobile along at about 6 miles an hour. Have the horse follow the automobile at about 10 feet. Let him follow the automobile for about 15 minutes. Then have the horse pass the automobile, leaving it on the right hand. The horse will probably shy a little. Do not attempt, if the road will permit, to hold him up to the automobile or to whip him on the near side, but let him shy. As soon as he has passed the automobile he will probably break into a run. Do not check him too suddenly, but speak to him, and he will soon come down to a slow trot. Then have the automobile speed up and pass the horse, leaving him on the right hand. Repeat these operations five or six times for another 15 minutes.

Next day the morning's proceedings should be repeated for say 10 minutes. Then the automobile should be stopped and the horse should be turned so as to face it. The engine, if it is a gas engine, should be slowly rotated. The horse will shy a little. He should repeatedly pass the automobile for say 10 minutes. Then the automobile should be set in motion slowly and he should pass it for 10 minutes more, after which he should be sent to the stable. The occupant of the automobile should call out to the horse when he is passing, in a loud voice, "whoa, boy."

The third morning he should be taken out and made to repeat or review all that he has learned on the first and second mornings, which should occupy 15 minutes. It will be found that he will probably not shy at all. The horn should be blown gently at first and later on vigorously. The occupant of the automobile should call out to the horse when passing, in a loud voice, "whoa, boy."

Always let a horse shy in passing an automobile, if the road will permit. It is quite useless to whip and spur a horse up to an automobile and to try and force him, by giving him pain, not to be afraid of it. It is also a bad practice, in driving a horse past an automobile, to stop the horse and have the automobile proceed past him. He is frightened and very apt to turn around. The proper way is to stop the automobile and let the horse be driven past it.

The Speeds at Which One Travels

One mile in min. and sec.	Is equal to, miles per hour.	One mile in min. and sec.	Is equal to, miles per hour.
5:00.....	12	0:52.....	69½
4:30.....	13⅓	0:51.....	70¾
4:00.....	15	0:50.....	72
3:30.....	17½	0:49.....	73½
3:00.....	20	0:48.....	75
2:45.....	21 4-5	0:47.....	76¾
2:30.....	24	0:46.....	78¾
2:15.....	26¾	0:45.....	80
2:00.....	30	0:44.....	81¾
1:50.....	32¾	0:43.....	83¾
1:40.....	36	0:42.....	85¾
1:30.....	40	0:41.....	87¾
1:20.....	45	0:40.....	90
1:10.....	51½	0:39.....	92¾
1:05.....	55½	0:38.....	94¾
1:00.....	60	0:37.....	97½
0:59.....	61	0:36.....	100
0:58.....	62½	0:35.....	102¾
0:57.....	63½	0:34.....	106
0:56.....	64¾	0:33.....	109
0:55.....	65½	0:32.....	112½
0:54.....	66¾	0:31.....	116
0:53.....	68	0:30.....	120

The A. B. C. of the Gas and Gasoline Engine

1. It is the purpose of this series of articles to describe the construction and operation of the gas engine in such simple language and with such attention to detail that it may be readily understood by those who, up to this time, possess no knowledge of the subject. The paragraphs will be numbered for future reference.

2. When gas engines were introduced the use of gasoline in connection with them had not been considered as a possibility. In later years, however, coal gas has been largely superseded by gasoline vapor, and gasoline engines are far more common than gas engines, except in the natural gas belt of Ohio and Pennsylvania, where the price of natural gas admits of the use of gas with greater economy than would be possible with gasoline. The principle of operation of the two are identical, however, and it should be understood that while gas engines are referred to throughout these articles for the sake of convenience, the description applies equally to gasoline engines.

3. In 1838 the first "two-cycle" gas engine was patented in England by William Barnett.

4. In 1862 Beau de Rochas formulated the cycle of operation of a gas engine, as afterward built by Professor Otto, commonly known as the Otto "four-cycle" engine.

5. In 1876 the first practical working engine was introduced by Crossley Bros., of Manchester, England, under the patents of Professor Otto.

6. Gas engines are of three types, known as stationary, marine and automobile. Their general characteristics are implied by their various designations. The stationary engine may be either vertical or horizontal. Marine engines, designed for application to

boats, are almost invariably vertical. Automobile engines are of comparatively recent introduction and of great variety, the aim of the designers being to secure the maximum of power and minimum of weight. They also may be vertical or horizontal.

7. These three classes are subdivided into "two-cycle" and "four-cycle" classes. In the former an explosion occurs at every revolution. In the latter there is an explosion at every alternate revolution. The principles of operation in each case will be described later.

8. Gas engines are dependent for successful operation on two things: First, a charge of gas or vapor, mixed with sufficient air to produce an explosive mixture, which is to the engine what air is to the lungs of a human being, and second, a method of firing the charge after it has been taken into the combustion chamber.

9. When coal gas is used the supply is taken from the main and mixed, by means to be hereafter described, with the necessary proportion of air. When gasoline is used air is mixed with it in the correct proportion by mechanical devices, also to be hereafter described.

10. After the charge of gas and air has been taken into the cylinder it is compressed, as will be shown later, by the action of the engine itself and then fired, usually by an electric spark actuated by the engine, but sometimes by the use of a tube screwed into the cylinder and heated from the outside, the heat, of course, being communicated to the gas. The resulting explosion operates the engine.

11. The principal parts of a gas engine are the cylinder, the piston, the piston rings which fit into grooves in the piston; two sets of valves, one to admit the charge and the other to permit it to escape after the explosion; a crank shaft and connecting rod which connects it with the piston head and a fly wheel, whose presence insures steady running of the engine and whose further functions will be better understood as the description proceeds. In the "two-cycle" form of engine there is really but one valve, the exhaust port being covered and uncovered by the piston itself.

12. All of the parts referred to are of the engine proper. Others, which are separate from the engine but on which its operation depends, are the carbureter, which supplies the charge of gasoline vapor or "greased wind" in the case of a gasoline engine, a simple device for mixing

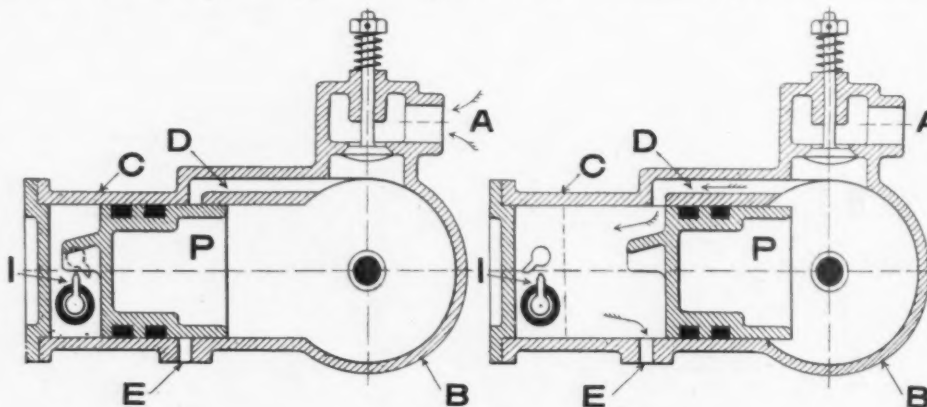


Figure 1

A—Admission Valve, B—Crank Chamber, C—Cylinder, D—Inlet Port, E—Exhaust Opening,
I—Ignition Mechanism

air and gas in the case of a gas engine, and the batteries and other parts of the electrical ignition device. A part which has no connection with the actual running of the engine but with which practically all are fitted is the muffler, whose purpose is to deaden the sound of the explosion.

13. All except very small engines are partly encased in a chamber through which water is circulated, the object of this being to keep the cylinder cool.

14. The foregoing brief outline of the functions of the parts of the engine prepares us for a description of the "two-cycle" form of motor. This particular form of engine sucks in a charge of gas or vapor, compresses it, fires it and discharges the product of combustion or burned gases while the crank makes a single revolution and while the piston makes one complete journey backward and forward.

15. Fig. 1 shows two sectional views—that is to say, views of the engine cut in two, longitudinally—of the principal parts of a "two-cycle" engine. Other parts, such as the crank shaft, connecting rod and fly wheel, are omitted to avoid confusion. C is the cylinder and B the crank chamber. A is the admission valve, through which the vapor passes to the crank chamber B. D is the inlet passage, through which it passes from the crank chamber to the cylinder. P is the piston, I is the igniter, which makes the electric spark when the lower point comes in contact with the upper. This causes the explosion of the vapor. E is the exhaust port, through which the burned charge escapes after the piston has been driven outward by the explosion and has reached the end of its stroke.

16. Let it be supposed that the engine is still and the crank chamber B is full of gas or vapor. To start the engine the piston is started by methods to be hereinafter described, and as it passes to the position shown in the right-hand drawing it forces the charge of vapor through the port D into the cylinder C. The piston then returns to its original position, moving away from the crank chamber C, and in doing so closes the port D and the exhaust opening E and compresses the charge of vapor. The points of the igniter come together, a spark occurs and the resulting explosion forces the piston outward again. When the piston reaches a point near the end of the stroke, as shown in the right-hand drawing, it uncovers the port E and the burned charge passes out, the new charge coming through the port D immediately afterwards.

17. The admission of the new charge to the crank chamber is controlled by the action of the piston. As the latter travels forward it has a tendency to create a vacuum

in the crank chamber. This draws the valve, which in the crank chamber. This draws the valve, which the charge of vapor.

18. It will be observed that there is a projection on the head of the piston. This is generally known as a baffle plate. Its object is to prevent the incoming charge from passing directly across the cylinder and out at the exhaust port E, which, it will be observed, is directly opposite it. The baffle plate directs the incoming charge toward the combustion chamber end of the cylinder, providing, as nearly as may be, a pure charge of vapor and assisting in the expulsion of the remainder of the burned gas remaining in the cylinder as a result of the last explosion.

19. Fig. 2 furnishes two views of a "four cycle" type of engine with some of the parts removed, as in Fig. 1. It shows, as before, a cylinder C, admission valve A, a piston P, igniter I, and exhaust valve E, in place of the exhaust port E in Fig. 1.

20. The left hand view, Fig. 2, shows the piston P about to draw a charge of vapor, by the same method as previously described, through the admission valve A into the cylinder C. The suction continues until the piston P reaches the position shown in the right hand view. Then the piston returns until it again arrives at the position shown in the left hand view, compressing the charge of mixture during this operation. Just before the piston arrives at the end of its travel in this direction, the charge of vapor, now under compression, is ignited by the method previously explained and its expansion forces the piston back to the position shown in the right hand view.

21. When the piston has, for the second time, reached the position shown in the right hand drawing a mechanical device, to be described later, opens the exhaust cylinder. The exhaust valve remains open until the piston has again arrived at the position in the left hand view. Then it closes, the piston again commences to suck in a charge of vapor and the cycle of operation is repeated.

(To be continued.)

E. R. Thomas, of New York, has offered his price-record holding Panhard for sale.

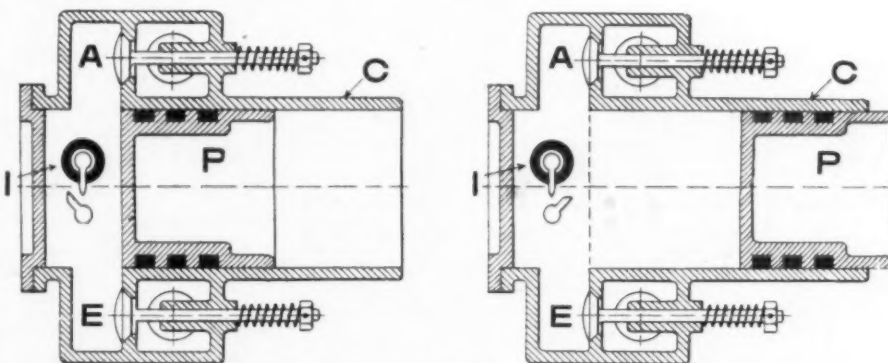


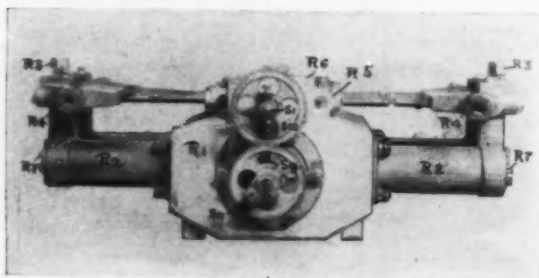
Figure 2

A—Admission Valve, C—Cylinder, E—Exhaust Valve, I—Ignition Mechanism

INDUSTRY

The type of steam engine with which Serpollet made his famous world breaking record is here illustrated and described. The engine, however, is of smaller size and of 12 B. H. P. It is a wide deviation from the usual steam engine construction as applied to automobiles, as it is built, to all intents and purposes, exactly like a four cylinder automobile gasoline motor, and has eight mechanically operated valves, one admission and one exhaust valve for each cylinder.

It consists of a steel crank chamber, R^1 , which is cast in one piece. To it are bolted the cylinders, R^2 , and the casting, R^3 . Each pair of cylinders is cast in one piece, together with the valve chambers. The one pair is exactly in line with the pair at the opposite end. The cylinder covers, R^7 , are screwed into place and the joint is made with asbestos; the cover itself is cast with suitable projections to enable it to be screwed up



Serpollet's Latest Motor.

tight. The passages leading from the centrally-placed steam pipe connections, R^3 , to the valve chambers and from them to the cylinders and the exhaust pipe unions, R^4 , are drilled out in the cast metal and plugs are screwed in where necessary to close the outer ends of the holes thus made. The valves themselves can be removed and are accessible for grinding in if necessary, by taking out plugs which screw into the back of the valve chambers in line with them. The live steam tends to keep each inlet valve closed, and is admitted to its respective cylinder when the valve is lifted off its seat by the cam. Similarly the steam in the cylinder tends to keep its exhaust valve closed, and is allowed to pass to the exhaust pipe connections, R^5 , when the valve is opened. The two inner are the inlet, those outside being the exhaust valves. The valves are of the mushroom type, and their spindles have long guides provided for them in the casting. They are made of tool

steel, and portions of the rods are ground to a true fit. Springs normally tend to keep the valves closed, as in gasoline engines.

PRIVATE BUT CONVINCING DEMONSTRATION

Smith & Mabley Entertain City Fathers and Pressmen and Astonish Them All

New York, July 21.—Smith & Mabley promoted an interesting and valuable all-around automobile test on Wednesday with Secretary Butler, of the A. C. A.; W. J. Stewart, chairman of the A. A. A. racing committee; two aldermen and a trio of newspaper men, of whom the MOTOR AGE man was one, as witnesses. Three Panhards—an 8 and a 12 horsepower tonneau and a 12 horsepower bus seating eighteen—were used in the demonstration.

Crowded thoroughfares and travel congested points both up town and down town were first sought that the skill of the drivers and the perfection of the braking might be shown. The progress through vehicle jammed Broadway, at Herald and Union squares, at the Brooklyn Bridge entrance, and in the Wall street district, was expeditious without even a shave at a collision.

Long Island was next visited. A brisk run of 20 miles brought the party to Kruger's Hotel near Mineola. Here some rough but most satisfactory braking tests were run by the two tonneau vehicles.

H. Armour Smith stopped the 12 horsepower machine in 35 ft. 3 in. twice while traveling at 30 miles an hour and in 31 ft. 9 in. at 20 miles. A French chauffeur made a stop of the same machine in 106 feet at a 1:45 rate and in 14 ft. 6 in. at 2:55 for the mile. George J. De Whiting brought the 8 horsepower car to a standstill in 91 ft. at a 2:05 rate. The trials really impressed Aldermen Joseph Oatmen and Armitage Matthews, of New York, who witnessed them.

On the way out Mr. Smith and Miss Eleanor M. Thomas had a lively brush for a mile or two in their 12 horsepower Panhards. Miss Thomas, who had two passengers beside herself, won by a comfortable margin. Mr. Smith's car carried five persons.

Mr. Whiting brought the three newspaper men back to town by moonlight after the trials at a 30 mile an hour clip, which utterly satisfied the journalistic yearning for him to "hit things up a bit." The vehicle used was the 8 horsepower car. The occupants of the

other car claim to have made the 10 mile run to Jamaica in 15 minutes.

A. Reed, a jewel of a find of Smith & Mabley for a press agent, was in charge of the run and conducted affairs with refreshing competency and good fellowship.

GIRARDOT'S CUP WINNER HERE

Undergoing Repairs in Cleveland—A Frenchman's Woes and Opinions

Cleveland, Ohio, July 22.—An interesting machine is being overhauled at the factory of the Hansen Automobile Co. It is an 8 horsepower Panhard, which has seen continual service for more than 5 years. It is the identical machine with which Girardot won the Paris-Dieppe race 5 years ago. The work is being done by J. Belin, a French expert, who until recently was with the Winton company. Belin has been in this country about a year and in France he was employed by several of the leading French makers as engineer. He entertained the writer with some amusing tales of his first experiences in this country. The day he landed he went for a spin on Riverside Drive, New York. Following the French practice of running at full speed whenever the road is clear, he turned into a smooth drive where there were a number of wheelmen and opened up. "In about 3 minutes," said he, "I had a whole army of policemen after me, waving their clubs. I thought they wanted to race so I waved my hand and turned on the speed. By and by I stopped for a drink and immediately I was surrounded by policemen. They grabbed me and put me into my car. I could not talk a word of English, but the policeman in charge motioned me to make it go and I followed his orders until he landed me in the station. There they found someone who could talk a little French and who ordered me to pay \$10. I did not know what it was for, but I paid. About 2 weeks later I found that I had not only broken the speed limit but had been scorching on the wheelmen's special drive."

Belin says the American manufacturers are coming to the front with astonishing rapidity. He thinks American cars are already as good as those of the same class in France and he is enthusiastic over the Winton touring car. He thinks the motor should be in front to insure smooth running qualities. The machine which Belin is rebuilding is being offered for sale. In principle it is practically the same as the Panhards of today.

New Longuemare Carbureter

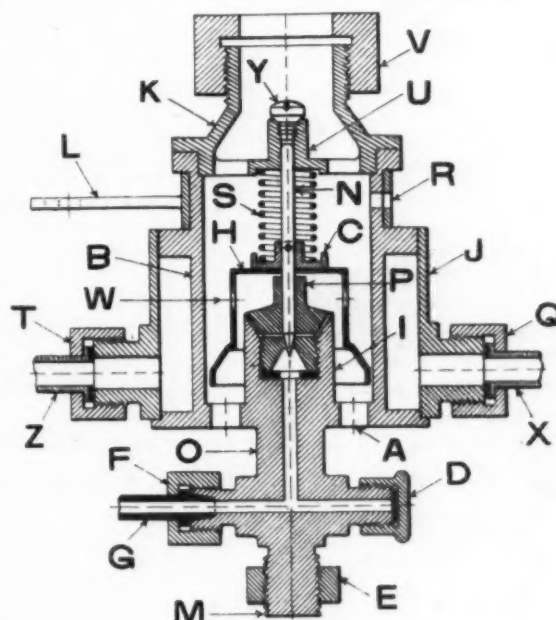
In a new carbureter just introduced by the French inventor, Longuemare, the float feed is discarded. The new device is of the same order as the American type of mixing valve which has been in use for several years, particularly by builders of marine gasoline engines, except that the French device has more complication and embellishment.

A needle valve stem N regulates the supply of gasoline through the opening around the plug P, which is screwed in the stem I. A hood or bonnet H is attached

to the spring cap C, which is fastened to the stem N by means of a small pin. The spring S normally keeps the gasoline outlet in the stem P closed.

When the carbureter is in action the air is drawn through the openings A in the bottom of the body B. This action has a lifting tendency upon the hood or bonnet H, as the openings W in the hood are considerably smaller than the openings A, and the needle valve stem N is therefore raised from its seat, permitting a flow of gasoline, which is thus thoroughly mixed with the air during its passage through the openings W in the hood H. A jacket J surrounds the body of the carbureter B, having pipe connections X and Z and unions Q and T, for heating the vapor either by hot water from the cylinder jacket or the exhaust.

The stem O, at the lower portion of the body, has a pipe connection C, and union F, and removable cap D,



New Longuemare Carbureter.

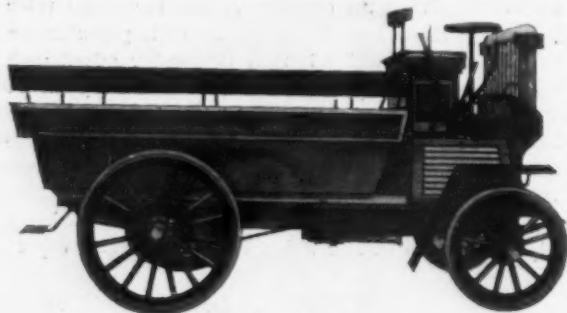
for the gasoline inlet connection to the mixing chamber. A threaded extension M, with lock nut E, is provided for attaching the carbureter in position. An extra air supply controlling device with openings R and lever L is also provided. The carbureter body has a removable cover K with spider V, which carries the upper end of the needle valve stem N. A union V for the pipe connection to the motor is also provided.

This carbureter is a radical departure from any before made by this concern and from French practice generally.

To the Top of Greylock Mountain

On the 13th a party consisting of F. C. Jager, Murray Sanford, a photographer, Mr. Chase, editor of the North Adams (Mass.) Freeman, a reporter for the Herald, J. C. Anthony and Mr. Carson, a demonstrator,

climbed Graylock mountain in two Locomobiles, regular stock carriages not prepared especially for the trip. The road, says the Freeman, is extremely rough and tortuous, full of deep ruts, and in some places very muddy and of varying degrees of grade up to 14 per cent or more. No great difficulty was experienced in making the ascent, the journey having been taken

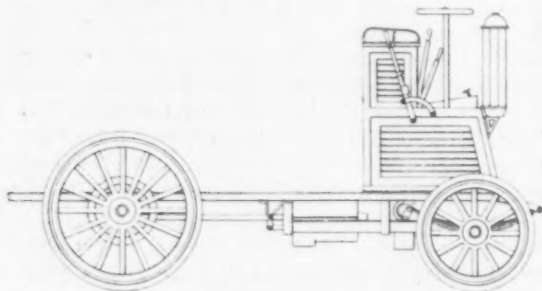


The Sterling Car, Fig. 1.

easily, and with a view of enjoying the scenery whenever a vista through the trees would permit. The arrival at the summit was the source of no little surprise to the visitors there, it being the first time that a horseless vehicle had ever reached it. There are places in plenty to take on water going up the mountain side and this was useful to the riders as well as the vehicles themselves. Although the distance to the summit is less than 10 miles from this city, the power expended in reaching it is far more than ten times that distance would have been on smooth, level roads, and no better test of the strength and efficiency of any motor vehicles has yet been made. Possibly it may be a common thing some time in the future to climb Graylock with the horseless vehicle. It is safe to say, at present, however, that this is without doubt one of the most difficult feats ever performed by a motor-carriage.

Sterling Public Service Car

The vehicle illustrated is manufactured by Stirlings Motor Carriages, Ltd., of England, and is said to have



The Sterling Car, Fig. 2.

been in operation over 12,000 miles, with practically no repairs. As its name indicates it is for public passenger service, but it can carry freight as well. Figure 1 shows the car fitted with a wagonette type of body,

with side seats for passengers, and Figure 2, with the body removed, ready to do duty as a freight truck.

The motor is of 12 B. H. P. with two cylinders, 4 inch bore and 5½ inch stroke, and runs at 750 revolutions per minute. The cost of operating this vehicle with gasoline at 20 cents per gallon, has been 1.36 cents per mile, equivalent to about .81 cents per mile at American price of gasoline. This vehicle made a trip from Glasgow to London, without a stop, in 17 hours. It seats from fourteen to sixteen passengers.

Late Issues From the Patent Office

No. 704,156, to Christian F. Weeber, of Albany, N. Y., covers a combined steering and brake lever. Used as a steering device the lever swings laterally on a horizontal axis and a forward motion of the lever applies the brake.

Nos. 704,253 and 704,254 are both to Henry K. Hess, of Philadelphia, Pa. The first covers a fuel feed for steam vehicles using coal or coke as fuel. The fuel is carried in a bunker situated in front of the boiler and is carried from there to the combustion chamber by means of a worm conveyor. Means are provided for operating this conveyor by hand when the engine is not running, but it is normally operated by connection with the engine, the operative mechanism being put into action by pressure upon a foot lever. A blower, similarly operated, is provided for furnishing an air blast in the combustion chamber when required. The latter patent covers modifications and details of the same device.

No. 704,296, to J. D. Carrington, of Newcastle, Pa., deceased, John S. Whitla, administrator, covers a device for automatically releasing one of the driving wheels of an automobile when turning a corner. A number of well intentioned designers have devoted their time and energy, not to mention their cash, to inventing and patenting devices of this nature, but it is hard to understand wherein they expect to improve upon the well known and commonly used form of differential gear which is in every way superior to any method of applying the power to one wheel under any conditions.

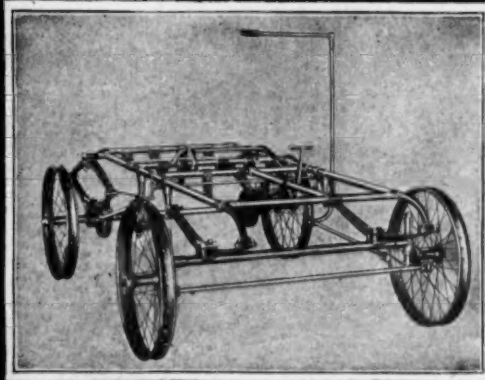
Plans of the Worthington Company

The Worthington Mfg. Co., whose organization with George C. Worthington, president; S. B. Leonard, vice-president; S. S. Rockwood, secretary and treasurer; A. L. Garford and S. M. Henson, directors, was duly recorded, has purchased the business of the Fay Tricycle and Invalid Chair Co., Elyria, O., and the golf goods business of the Automobile & Cycle Parts Co., at Westboro, Mass. The golf business will be transferred to the Elyria factory at once, thus combining the two businesses in one plant and under one management with S. B. Leonard, who has been in charge of the Westboro factory for the Automobile & Cycle Parts Co., as general manager. The company's Elyria factory is the one formerly owned by the Fay Mfg. Co., original makers of the Fay juvenile bicycles. One-half will be devoted

HERCULES RUNNING GEARS

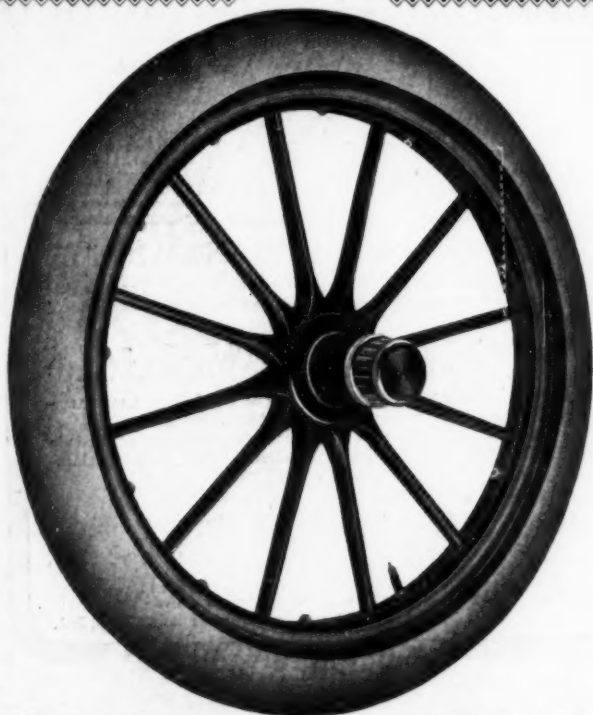
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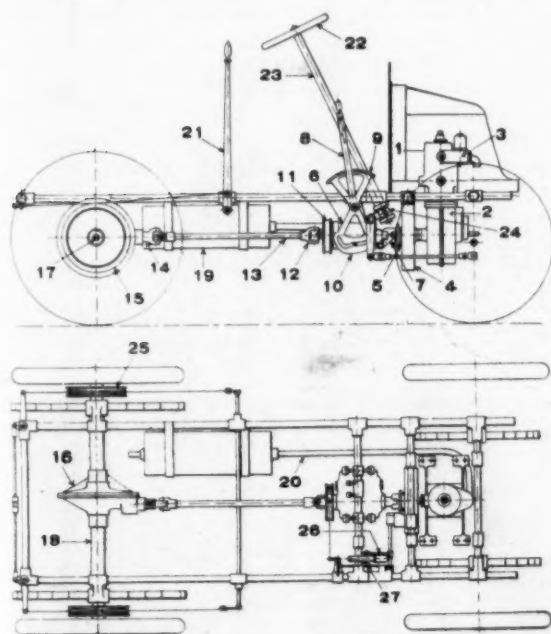
FACTORY AND EXECUTIVE OFFICE: South Bend, Ind.

to golf goods, the other half to tricycles, juvenile bicycles and invalid chairs.

Running Gear of the Argyle

Reference will be found in another column to the latest requirements of European design, under which it is intended that nothing shall interfere with freedom of the body from the running gear and nothing shall project above the frame, behind the dashboard. One of the first examples of this form of construction is the Argyle, a car made, as its name implies, in Scotland, by the Hozier Mfg. Co. All the parts are made from castings, stampings, tube and raw material in the concern's own shops. The car is equipped with a vertical single cylinder motor of 8-horsepower placed in front with its shaft longitudinally, or at right angles to the front axle. On the third speed the motor is directly connected to the bevel gears which drive the rear axle, by means of a longitudinal shaft with flexible joints or universal couplings. The three speeds and reverse are controlled by a single operating lever, operated through the medium of a cam quadrant as shown in the drawing.

A unique feature of an emergency brake provided is the equalizing device, shown in the plan view of the



Side Elevation and Plan of the Argyle Car

1—Motor. 2—Crank chamber. 3—Valve chamber. 4—Fly wheel. 5—Friction clutch. 6—Gear box. 7—Clutch fork. 8—Gear striking lever. 9—Sector. 10—Gear striking cam. 11—Band brake. 12—Forward universal joint. 13—Driving shaft. 14—Rear universal joint. 15—Driven bevel gear. 16—Differential gear case. 17—Live axle. 18—Tubular sleeve. 19—Muffler. 20—Exhaust pipe. 21—Emergency brake lever. 22—Steering wheel. 23—Steering column. 24—Steering worm and sleeve. 25—Emergency band brake wheels. 26—Clutch pedal. 27—Band brake.

running gear at the rear of the frame. This consists of two bell crank levers attached, one to each corner of the frame, and connected by a tie rod with an adjust-

able turnbuckle in its center portion. Many American makers use brakes attached to the rear wheels, but none so far has adopted this form of equalizing device. By this method of construction any difference in the length of the flexible wire ropes which control the bands upon the brake wheels, is automatically compensated for and the pressure upon the brake wheels, when the brake bands are tight and upon them, is at all times equal. The frame proper is built up of steel tubing and fittings, making a light and yet exceedingly strong construction. Wheel steering is used with worm and sleeve control. The general arrangement and construction of this car is exceedingly simple and compact and is worthy of note.

Centaur Company's Election and Plans

At a recent meeting of the Centaur Motor Vehicle Co., of Buffalo, the following officers and directors were elected: Emery Lewis, Jr., Bradford, Pa., president; H. C. Wilcox, Bradford, Pa., vice-president; J. B. Eccleston, Buffalo, N. Y., secretary and treasurer; Delevan Emery, Bradford, Pa., and M. F. Barrett, Buffalo, N. Y., directors.

The company has made a long time lease of the five story brick factory building at 59 Franklin street, having two store fronts on Franklin and is now installing machinery for the manufacture of Centaur electric and gasoline automobiles. Senator Emery, president of the company, is known throughout the business world by reason of the successful competition he has conducted against the Standard Oil Co. and the position he occupies as the only individual competitor operating refineries, pipe lines, ocean tank lines and distributing stations in almost every country of the world. Mr. Emery and his associates men are progressive men, and being heavy stockholders have a pride in assisting, financially, in the development of the new company which under the management of Messrs. Wilcox and Eccleston will become an important factor in the automobile trade.

Plans are advanced for 1903, when the company hopes to be in position to supply gasoline and electric rigs promptly.

Must be a Wonderful Lubricant

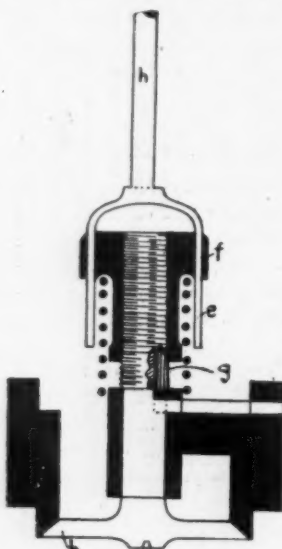
A correspondent, writing to the Autocar, relative to a lubricating oil known as Wilburine, says:

"I wish to confirm what you say about this oil. I have used it for over a year with my $3\frac{1}{2}$ -horsepower air-cooled engine (no water-cooled head). The engine never overheats—in fact, the harder it is run the better it seems to go. Further, I never drain off the old oil out of crank chamber, and I have no bad effects. A fortnight ago myself and wife took a trip into North Wales, doing 200 miles in 2 days. This week we did another 200 miles in the same time, traveling from Southport to Windermere, Newby Bridge, Hawkshead, Ambleside, and back to Windermere; then for second day to Kirby, Lonsdale, Settle, Clitheroe, Preston and Southport. Needless to say, there is a lot of hill work

in this journey. My car is belt driven, and weighs 655 pounds without passengers. I have run the car 2,000 miles on less than 1 gallon of Wilburine."

English Admission Valve Regulator

The accompanying cut shows a type of admission valve recently put on the market in England. Results claimed for it are increased speed of the motor and decrease in fuel consumption. It is, of course, intended for use on a gasoline motor.



Admission Valve Regulator

The valve (b) has a screw nut or cap (f) with two slots cut in its flanged portion. The forked part (e) of the controlling rod (n) passes through these slots, enabling the operator to compress the spring by means of the rotation of the screw nut or cap (f) through the medium of the forked end (e) of the rod (n). This operation effects a twofold purpose, increasing the strength of the spring and diminishing or reducing the lift of the valve (b), thereby regulating the size of the charge in the cylinder of the motor. There are, however, several American-made devices controlled by a sliding wedge, which effect the same purpose and are much simpler in construction and operation.

Harrington-Dyke Automobile

The machine here illustrated was made by W. T. Harrington, of St. Louis, Mich., from parts supplied by A. L. Dyke, of St. Louis, Mo. Mr. Harrington is a banker, hotel proprietor and owner of a general merchandise business. The vehicle, as shown, carries four people—and a dog—but the dash can be dropped, providing an additional seating capacity for two persons. Its first trial was over 60 miles of rough road, which it covered in better time than some other machines of well-known make. This is Mr. Harrington's second machine. He built the first some months ago of Dyke's No. 1 outfit.

New Incorporations and Enterprises

CHICAGO, ILL.—The Hafner & Willing Machine Co., Oak Park; capital, \$25,000; manufacturing automobiles; incorporators, Andrew J. Redmond, Marshal E. Gallion and Nellie M. Tobin.

BROOKLYN, N. Y.—The Pomeroy Motor Vehicle Co. has been chartered by the secretary of state. The capital stock is \$120,000. The directors of the company for the first year

are as follows: Bernard H. Pomeroy, James L. Lazelle and Charles D. Winfield, of Brooklyn.

MARION, O.—For the last 3 years Schuyler Zent has been experimenting in the manufacture of gasoline automobiles. His experiments have resulted in the perfecting of a machine, and he is now at work manufacturing the last of five carriages, all of which have been sold. Mr. Zent has occupied quarters in the old Huber building on North State street. The machines will be built on a large scale and other quarters will be secured. Interested with Mr. Zent is a prominent Marion gentleman of wealth, and there is a sufficient demand for the machines to predict that before long they will meet with a large sale.

Exports of Bicycles, Automobiles, Etc.

WASHINGTON, D. C., July 17.—The following is a list of exports of bicycles, automobiles and parts of for the week just ended from the port of New York:

Antwerp—Bicycles, three packages, \$75; bicycle material, thirteen packages, \$556.
Amsterdam—Bicycles, twenty-six packages, \$775.
British East Indies—Bicycles and material, eighty-one packages, \$2,421.
British West Indies—Bicycles and material, twenty-three packages, \$424.
Brazil—Velocipedes, one case, \$33.
Belfast—Bicycles, two crates, \$70.
British Guiana—Bicycle material, four packages, \$34.
British Possessions in Africa—Bicycles, fifteen crates, \$880.
British Australia—Bicycles and material, eighty-three packages, \$1,600.
Cuba—Bicycle material, six cases, \$95; velocipedes, one case, \$49; tricycle, one case, \$13.
Chili—Velocipedes, one package, \$14.
Dutch East Indies—Bicycles and material, eleven packages, \$649.
Dutch West Indies—Bicycles and parts, two crates, \$30.
French West Indies—Bicycle material, one package, \$150.
Genoa—Bicycle material, fifteen packages, \$435.
Glasgow—Bicycles, fifteen cases, \$450.
Havre—Bicycle material, sixteen packages, \$1,230; bicycle material, four packages, \$80.
Hamburg—Bicycles, eleven packages, \$546; bicycle material, twenty-five packages, \$825.
Hull—Bicycle material, fifteen packages, \$150.
Lansanne—Bicycles, forty-one crates, \$615.
Liverpool—Bicycles, eighty-one packages, \$1,459.
London—Bicycles, 125 packages, \$4,657; bicycle material, eighty-four packages, \$5,444.
Mexico—Bicycle material, one package, \$17.
Malta—Bicycles and material, five packages, \$230.
Newfoundland—Bicycles and material, two packages, \$122.
Peru—Bicycles, three packages, \$12.
Rotterdam—Bicycle material, twenty-one packages, \$800; bicycles, one crate, \$20.
London—Motor vehicles and parts, seventeen packages, \$10,937.

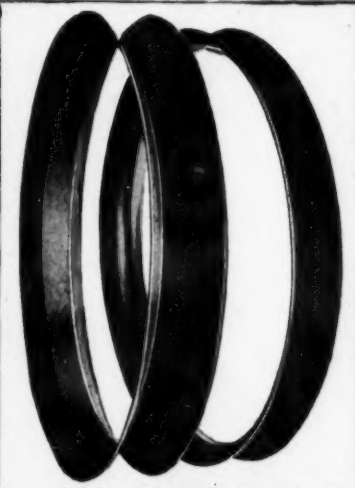


Mr. Harrington's Gasoline Carriage

STEEL RIMS

CRESCENT
AND DROP CENTER

FOR WIRE
OR WOOD WHEELS

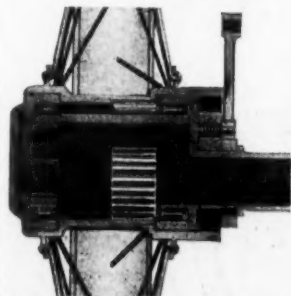


ANY DIAMETER
UP TO 4 IN. CROSS SECTION

DRILLED OR UNDRILLED
AS REQUIRED

AUTOMOBILE AND CYCLE PARTS CO.
SMITH STAMPINGS FACTORY
Milwaukee ✂ ✂ Wisconsin

We Are Making History.



Lindsay's Patent Anti End Thrust
Transmission.

Perhaps you as a manufacturer or a dealer in Automobiles don't realize it, but the ads of this company are making History. They are telling you of a time when the Lindsay Gear will be universally recognized and used by the automobile trade of America. Why? First, because it is scientifically correct in all details of construction, and, Second, because it is so carefully covered by United States patents as to make it impossible to build an automobile with **A TUBULAR AXLE, A DIFFERENTIAL** or a **DRIVE SHAFT** without infringement.

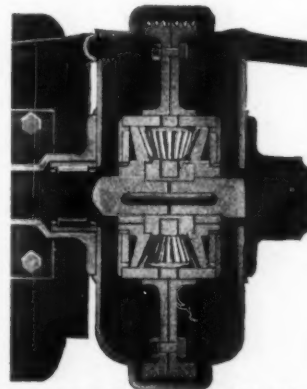
It sounds strange to many of you that this claim should be made at this time, but strange or not

IT IS TRUE
And "Truth Shall Prevail."

We are, however, ready to supply you with our

REAR AXLES, DIFFERENTIALS, or COMPLETE GEARS

At prices about the same as it costs you now to make others **NOT SO GOOD.**
Why not be on the safe side? **FIGURE WITH US.**



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Shaft Coupling.

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STANDARD

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DOUBLE
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 TIRES

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Few devices have been the subject of a greater inventive faculty or more persistent and successful exploitation, and few have reached such a high state of development.

They Never Vary in Quality or Workmanship Because They Cannot Be Made Better or of Better Materials

If the BEST is none too good for you, it will pay you to adopt these widely and most favorably known tires. Every user is bound to be satisfied with them.

True Economy Represents Buying the Best Wherever You Can Find It

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THE TURNER ENDLESS SOLID TIRE

for very heavy vehicles. Particularly adapted for use where proper strength is required and length of service is guaranteed.

THE HARTFORD RUBBER WORKS COMPANY

Hartford, Conn.
U.S.A.



Dayton, O.—Editor MOTOR AGE: I have a 4 x 4 gasoline motor which is claimed by its maker to develop $3\frac{1}{2}$ brake horsepower at from 750 to 900 revolutions per minute. The motor seems to have fairly good compression and runs all right, but does not seem to me to develop the power claimed for it. Can you tell me of a way that I can test it and get its actual brake horsepower?—Yours, etc., J. H. P.

An article on how to make a brake test to ascertain the actual power developed by any type of steam, gasoline or electric motor will shortly appear in MOTOR AGE.

Leaky Piston Rings and the Remedy

Milwaukee, Wis.—Editor MOTOR AGE: I have been having trouble with the 6-horsepower gasoline motor on my automobile. It is practically new, as I only recently purchased the rig. I have great trouble in starting the motor, having to turn the crank fifteen or twenty times. The piston rings seem to leak, so that the motor does not hold compression, as the air can be heard leaking, by turning the crank over and holding the piston on the compression. I had a new set of piston rings made in a machine shop here, about 1-16 of an inch larger than the old ones, but it seemed to make matters worse. If you can give me any remedy for this difficulty, I shall appreciate the same.—Yours, etc., B. E. N.

The trouble with the motor is evidently in the rings. The remedy desired will be found in MOTOR AGE of July 17, page 14, in answer to Machinist.

Trouble with Vibrator Coil

Springfield, Ill.—Editor MOTOR AGE: I am having trouble with the induction coil of my car. It is of the trembler or vibrator form, and was furnished with the car by the makers. It is the second coil I have had, they having at my request furnished it to me. What I want to know is, can I use this coil to make a plain jump spark, and how must I adjust it to do so?—Yours, etc., L. R.

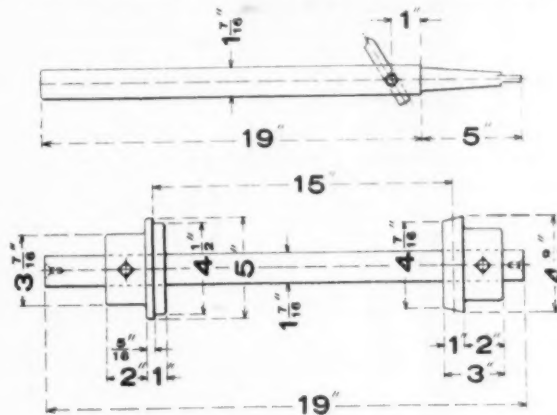
Clean off the platinum points on the vibrator and screw up the adjusting screw so that the vibrator will

not work. Then test the coil by means of sparking plug and battery to ascertain if the spark will jump across the points of the plug. If it does not jump, or jumps only once in awhile the coil is too small. When a larger one is substituted, however, a plain jump spark coil should be bought instead of the vibrator form. It is usually figured that a coil with vibrator attached will give a jump spark twice as long, as the same coil will without vibrator. MOTOR AGE will shortly present an article containing instructions how to make a trembler or vibrator device, for a jump spark coil, that will work.

Boring and Finishing Cylinders

Youngstown, O.—Editor MOTOR AGE: I have a job on hand to bore and finish, complete, a number of cylinders for automobile gasoline motors. I tried to bore them by holding them by one end in the lathe chuck, but found, after boring one of them, that it was tapered. It was largest near the chuck in which it was held. How do you account for this? The lathe was in good condition and practically new. Could you suggest some way by which I can bore them quickly and cheaply, and yet so that they will be perfectly true. I took this work by contract and am in trouble unless I can get help through your valuable paper. These cylinders, I omitted to say, are $4\frac{1}{2}$ inches bore and 15 inches long.—Yours, etc., J. Frank.

The reason the cylinder was tapered is that the great



Tools for Machining Cylinder.

length of the same caused it to yield or spring under the pressure of the cutting action of the lathe tool. Of course, the closer the lathe tool came to the chuck the more rigid the surface it was cutting. A better way to bore the cylinders would be to make a boring bar to fit in drill socket of a back-gear drill press and a brass or phosphor bronze bushing to fit in the center hole of the table of the drill press. The cylinder can be clamped to the table of the drill press by its flange and bored out with cutter set in the boring bar. Not less than three, and preferably four, cuts should be taken to make a good job. A mandril should then be made with two flanged hubs, one of which should be fastened to the mandril and the other turned slightly

taper so as to make a snug fit in the cylinder bore when in place. The ends of the cylinder can then be finished on the mandril and a perfect job will be the result. In case a back-geared drill press is not handy the cylinders can be clamped to the carriage of the lathe, bored out with a bar in the lathe centers and the ends finished in the manner above described, but it is a much slower job than in the drill press. The accompanying sketch shows the boring bar and cutter for use in drill press. The cutter should be made from a piece of round tool steel not less than $\frac{3}{8}$ of an inch diameter. It can then be readily adjusted to any desired angle to obtain the best cutting effect. The mandrill and flanged hubs for finishing the cylinder ends are also shown.

Cutting Spiral Gears

Plainfield, N. J.—Editor MOTOR AGE: I have been trying to cut some spiral gears for use on an automobile gasoline motor, and so far have had no success. I want to use them for the two to one reduction gear which operates the valves, and as I have not room for two gears, one of which would be twice the diameter of the other, on account of the size of the end of the crank shaft on which one of them goes, I must make them of equal diameter. The centers of these gears can be from $2\frac{1}{2}$ to $2\frac{3}{4}$ inches apart, but not more nor less than these measurements. I was told by a party who has a machine shop here, that the correct cutting angles should be 60 degrees for the driver and 30 degrees for the driven gear, but they do not pan out right after cutting. Further, from the way I figured out the pitch and cutter to use, the spaces are wider than the teeth after cutting, and there would be too much lost motion between the gears even if the cutting angles were correct. I should be greatly obliged if you could give me the information as to what the correct cutting angles should be, what pitch to cut the gears, and also the proper number of cutter to use for the same.—Yours, etc., G. T.

The information desired cannot well be given and explained in detail without the use of trigonometrical formula, but we have endeavored to give the data in as simple a manner as possible. The pitch diameter of the gears should be 2.24 inches, the cutting angles $63\frac{1}{2}$ degrees and $26\frac{1}{2}$ degrees respectively. The diametral pitch of the gears will be No. 8, with 8 and 16 teeth, and the gears should be cut with cutter for 18 teeth, just as if the gears had 18 teeth each, which would be practically correct for this pitch diameter with No. 8 diametral pitch.

How Shall the Cranks be Placed

Cincinnati, O.—Editor MOTOR AGE: We wish to say, regarding your answer to the inquiry of E. C. Wescott in your July 3 number, that we have found from experience that the effect is exactly opposite to what you claim. We have two well known cars in our store with 12-horsepower double cylinder upright motors. One of these is constructed with cranks at 180 degrees, giving two explosions very close together, and two idle strokes

giving a period of more than double that between the explosions. The other is constructed with both connecting rods on one crank, giving an impulse every revolution, explosions of course, being at regular intervals. The difference in vibration of the two mentioned machines is glaring. The one with cranks at 180 degrees runs without any vibration to speak of, while the other dances up and down very uncomfortably. We believe the two close explosions balance the engines in this manner: The first explosion forces the engine in the opposite direction from the cylinder head, which is down; and the second taking place so quickly, catches it on its rebound and opposes the swinging motion which once started, would be increased by regular explosions. The effect would be the same as a regiment of soldiers marching over a bridge. If the marching step were not broken the bridge would be shaken down. The writer would like to hear some other opinions regarding this matter.—Yours, etc., The Special Motor Vehicle Co.

Such conditions as are described should not exist if the motor, with both connecting rods on one crank pin, were properly balanced by counterweights in the fly-wheel. There are numbers of motors of this type running with practically no vibration whatever. It is a fault with French manufacturers particularly to neglect this important point of counterweight to balance the pistons, connecting rods and crank pin. In good practice such a type of motor should not only have its reciprocating parts balanced, but should be overbalanced to compensate for the impact resulting from the sudden change of direction of the moving parts at the end of the outward strokes. A double cylinder motor having two consecutive impulses, and then two idle strokes, does not distribute the power as uniformly as one with an explosion and idle stroke alternately. Further, it makes more unpleasant riding in the vehicle than the other type, as it acts almost like a large single cylinder motor of the same power, propelling the vehicle by a series of jerks.

Kansas City automobilists, in anticipation of their endurance run, made a run of 50 miles on the 13th. The only machine which made a non-stop journey and required no repairs or adjustment was the Pierce, the same machine, by the way, which made such an excellent showing in the eastern contests and will take part in the Chicago club's run on Saturday of next week.

The question has been raised whether an insurance policy holder has the right to store a motor bicycle in an insured structure. It seems to be generally believed among insurance men that the standard fire insurance policy does not cover risks of motor bicycles and that owners of buildings in which motor bicycles are stored should apply for permits.

Walter R. Smith, a member of the Chicago club, accompanied by G. R. Rohrer, has just made a trip from Chicago to Crawfordsville, Ind., and return, a distance of 535 miles, going by way of South Bend and Frankfort, at each of which places they spent a night.

SECOND

EDMOND, - - 16h., 12m., 30s.

THIRD

BARAS, - - 17h., 17m., 52s.

FIFTHHEMERY, - 17h., 28m., 38³/₄s.**SIXTH**

MARCELIN, - 17h., 45m., 18s.

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DARRACQ


Vehicles have
figured brilliantly

In the Paris-Vienna Race

Taking FIRST PLACES and establishing records as they usually do; but most noteworthy is the fact that in the General Classification the light Darracq vehicles are third and fifth,

Beating Twenty Heavy Racing Machines

Proving not only that the Darracqs are the fastest, but are also superior to the Mastodon Racers in Endurance, Reliability and Regularity.

 IMMEDIATE DELIVERY.

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AUTO. CO.

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GUILLAUME, 18h., 54m., 50s.



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The Ideal Automobile for business and pleasure, combining strength and practical merit with mobility in control, economy in operation and lasting wearing quality—starts and stops at will and travels all roads with equal safety—in a class by itself—an everlasting runner. Call on any of the following sales agents or write direct for handsome, illustrated, descriptive book.

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 Oldsmobile Co., 411 Euclid Ave., Cleveland, O.
 W. E. Metzger, Detroit, Mich.
 Ralph Temple & Austrain Co., 283 Wabash Ave., Chicago, Ill.
 Fisher Automobile Co., Indianapolis, Ind.
 Olds Gasoline Engine Works, Omaha, Neb.
 W. C. Jaynes Automobile Co., 873 Main St., Buffalo, N. Y.
 F. L. C. Martin Co., Plainfield, N. J.
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 Hyslop Bros. Toronto, Canada.
 Manufacturers' Co., 36 Fremont St., San Francisco, Cal.
 A. F. Chase & Co., 215 Third St., Minneapolis, Minn.
 Oldsmobile Co., 725 National Ave., Milwaukee, Wis.
 Rochester Automobile Co., Rochester, N. Y.
 Jas. B. Seager, Tucson, Ariz.
 F. E. Gilbert, Jacksonville, Fla.
 Texas Imp. & Mach. Co., Dallas, Tex.
 Abbott Cycle Co., New Orleans, La.
 C. H. Johnson, Atlanta.
 Sutcliffe & Co., Louisville, Ky.
 Brown-Thompson & Co., Hartford, Conn.
 Mason's Carriage Works, Davenport, Iowa.
 Adams & Hart, Grand Rapids, Mich.
 Kline Cycle & Auto Co., Harrisburg, Pa.

OLDS MOTOR WORKS,

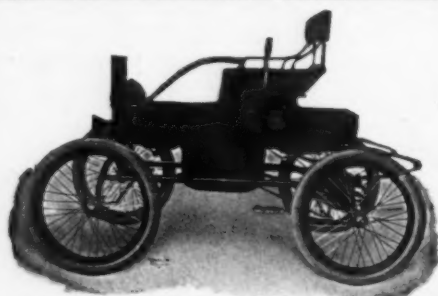
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THE BAKER

IF IT'S A BAKER IT'S THE BEST

The Most Efficient of all Electric Vehicles



THE LIGHTEST WEIGHT
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We will send you a Catalogue, or we will write you. Address
 The Baker Motor Vehicle Co.,
 CLEVELAND, OHIO



The Bordentown (N. J.) Mobile & Transportation Co., organized early in the present year, has been operating successfully for the last two months. Its capital stock is \$50,000, and its officers are James W. Cain, president; Lewis J. Vandergrift, vice president; William C. Steele, secretary, and James S. Gilbert, mayor of Bordentown, treasurer and general manager.

The company started operations on June 4 with one Mobile, designed to carry a dozen passengers, intending to run this machine regularly between Allentown, Yardville, Bordentown and Columbus, but owing to the bad condition of a portion of the road concluded that the construction of the machine was too light for the work, and therefore operated it during June about the streets of Bordentown, taking one or two runs to the seashore, a distance of about 60 miles, and going once or twice as far south as Washington park and as far north as Orange. The result of the first month's business was that the company was able to pay a dividend of 3 per cent on the stock sold to that time. It was then decided to send the machine to the seashore and it has since been running between Asbury Park and Avon-by-the-Sea, a distance of 2 miles, for which a fare of 25 cents is charged.

The company desires to sell more stock and extend its operations. Under its charter it has the right to manufacture, buy, sell and deal in all kinds of horseless carriages and to operate them as stage lines. It is intended to buy one or two substantial machines, one of which will be placed on the route originally mapped out and one or two between Burlington and Mount Holly, unless another company is formed to cover that territory, as has been suggested. In that event efforts will be made to consolidate the two enterprises and make one strong company. The operation of the one vehicle at present owned has been fairly satisfactory, but the company is now investigating gasoline vehicles.

MONTPELIER, IND.—Ever since the establishing of the automobile line south and east of the city which connects Dunkirk with several of the other smaller towns in that neighborhood, some parties have been considering establishing an auto line from Hartford City to Redkey and Marion, connecting with the towns of Dunkirk, Millgrove and Upland. The autos which will be used will carry about twenty-five people. They will probably be of the gasoline type. Arrangements can be made for the transportation of baggage, and if the

undertaking proves to be a success it is possible that baggage wagons will be put into service. The roads from this city to Redkey and Marion are good. A gentleman is expected in Hartford City within a few days to go over the route and a line from Hartford to Montpelier may be added to the others mentioned. The line from Dunkirk and Redkey to Portland, it is understood, has been a financial success. Other automobile lines over the country are good paying property.

PAOLI, IND.—A move is being made to establish an automobile line between Paoli and New Albany over the old Vincennes and New Albany turnpike road. It is the intention of Rhodes & Bro., of this city, to establish this method of conveying passengers instead of the present method of using the old-time "Deadwood" stage coaches. Passengers are now conveyed the entire distance of 41 miles in these coaches, and a through trip is made each way every day except Sunday. The United States mail and a vast quantity of freight are distributed to the numerous intervening towns, all of which are without railroad facilities. It is the intention to place automobiles on the route that will have a capacity for carrying sixteen passengers.

SACRAMENTO, CAL.—From all accounts the establishment of an automobile route over the Sierras from Placerville to Lake Tahoe has not proved a success. The first trip occupied the best part of 3 days and the second trip ended half way to Lake Tahoe on account of the gasoline giving out. It is claimed that the passengers got out and pushed the machine along the road to Riverton, where a boy was dispatched to a neighboring mine for more fluid. Coming back the regular stage coach was encountered, and the horses, frightened at the horseless vehicle, whirled around in the road, snapped the tongue out of the stage and piled up a bill of damages.

SEYMOUR, IND.—A. W. Mercer is interesting foreign capitalists in a scheme to establish a line of passenger and freight automobiles running from Seymour to all points of the county. There are 400 miles of gravel road in Jackson county, and it is expected to put on a daily service reaching every township and to establish a schedule service from Seymour to Salem via Brownstown, Vandalia and Medora, over a route which has been talked of for an electric line for several years.

LOUISVILLE, KY.—Automobiles are to supplant stage coaches between New Albany and Paoli, Ind., a distance of 40 miles. It now takes a day with a relay of horses to make the trip one way. It is the intention to carry freight and express as well as passengers in the automobiles, and the round trip will be made in eight hours. The roads are good between the towns.

NEWARK, N. J.—The Glassboro Township Committee has granted permission to a company to operate a line of automobiles between Clayton, Glassboro, Pitman, Barnesboro and Mantua, where connection will be made with the Camden trolley line. It is probable the automobiles will begin operation about August 1 and make a trip every half hour.

DENVER, COLO.—Denver is going to have an automobile package delivery company. Incorporation papers have been filed for the Merchants' Mobile Delivery Co. The company is incorporated for \$50,000. The company will also buy, sell and manufacture automobiles and other vehicles. The incorporators are J. B. and J. R. Walker and A. C. Phelps.

MOUNT HOLLY, N. J.—Representatives of a Trenton syndicate arranged yesterday for the establishment of an automobile line between this place and Burlington, and the machines will be running within a few weeks.

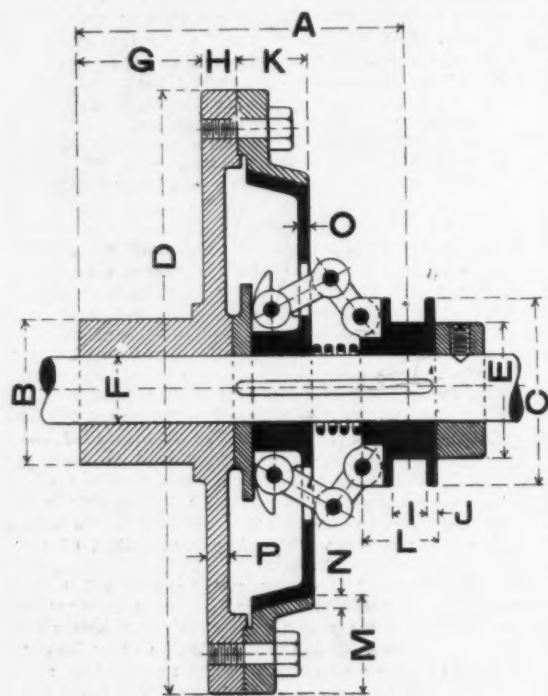
MCPHERSON, KAN.—A local firm has ordered material for an automobile 'bus. This machine will be made in the shape of a 'bus and will be run by a gasoline engine. It will be made large enough to carry twelve people.

The Goodyear Tire & Rubber Co., of Akron, Ohio, will break ground about August 1 on a large addition to its plant. It will be 300 feet long by 100 feet wide and four stories high.

New Combined Cone and Toggle Friction Clutch

The accompanying cut shows a modification of a new form of combined cone and toggle friction clutch much used in England. It has two distinct advantages over the French type of leather-faced simple cone friction clutch, in that it has no end thrust, and consequently no ball thrust bearings are required as in the French type. Further on account of the toggle action a very slight pressure on the sleeve suffices to firmly engage and hold the male and female parts.

As will be seen by reference to the drawing, the toggle levers have small curved surfaces on their ends which



Combined Cone and Toggle Friction Clutch

are inside the male part of the cone friction. Upon the sleeve being pushed forward toward the cone frictions these curved ends are forced together or inward in the direction of the shaft, forcing the plate or disk against the hub of the spider, which carries the female part of the cone friction. This action forces the male part of the cone friction towards and the female part away from the sleeve, bringing their two faces or surfaces into firm contact.

The coiled spring shown around the shaft, and between

the sleeve and the male portion of the cone friction, forces the two parts of the cone friction out of engagement upon the releasing of the pressure upon the toggle links by the sleeve. A set collar is shown upon the shaft to the right of the sleeve to limit the movement of the same in an outward direction or away from the cone friction. The hub of the spider, which carries the female part of the cone friction, runs loose upon the shaft, while the plate or disk and the hub of the male part of the cone friction is keyed upon a feather in the shaft, but free to slide upon the same, as is the sleeve.

A table is appended, giving the general dimensions of this clutch, in sizes of from $\frac{1}{2}$ to 10 horsepower at a speed of 100 revolutions per minute. For any other speed the horsepower may be readily calculated.

The trustee in the matter of Steam Vehicle Co. of America has presented a report to the referee recommending the operation of the plant for the purpose of completing carriages on hand in various stages of completion, and asking permission of creditors to raise money for said purpose; attached to which report are estimates of the costs thereof and the probable advantage to the estate of such operation, and praying that his report be submitted to the creditors for their action; that the said report will be submitted to the meeting of creditors to be held July 30, at 1:30 o'clock, at 534 Washington street, Reading, Pa.

The manufacturing facilities of the International Automobile & Vehicle Tire Co.'s plant at Newton Upper Falls, Mass., have been taxed to the utmost. To overcome this difficulty, the firm has purchased the factory formerly owned by the Meyer Rubber Co., at Milltown, N. J., and as rapidly as possible is removing its plant to that place. The new plant is one of the largest of its kind in the country. It has a floor space of about 200,000 sq. ft. New and modern machinery and all the latest known appliances for manufacturing rubber goods are being installed.

One of the events to be decided at the Long Island club's races on August 23, will be a 25 mile lap race. In order that there may be no time lost by the contestants, and as an additional incentive to "hustle from the word go" an award of \$5 will be made to the winner of each lap. This is in addition to a purse or cup of \$100 to the winner and a cup or purse of \$50 to the second.

Adam Axline, of North Baltimore, O., is experimenting with gasoline vehicles and expects to go into the business.

TABLE OF DIMENSIONS OF CONE AND TOGGLE FRICTION CLUTCH

Horsepower of Clutch at 100 Revs. Per Minute.	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Cap Screws.	Toggle Pins.
$\frac{1}{2}$	4 $\frac{1}{4}$	1 $\frac{3}{4}$	2 $\frac{1}{2}$	6	1 $\frac{3}{4}$	1	1 $\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{3}{16}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{1}{4}$	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{8}$
$\frac{3}{4}$	5 $\frac{1}{4}$	2	2 $\frac{3}{4}$	7 $\frac{1}{2}$	2	1 $\frac{1}{4}$	1 $\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{3}{16}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{1}{4}$	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{8}$
1 $\frac{1}{4}$	6	2 $\frac{1}{4}$	3 $\frac{1}{4}$	9	2 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{3}{16}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{1}{4}$	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{8}$
2	6 $\frac{3}{4}$	2 $\frac{3}{4}$	3 $\frac{3}{4}$	10 $\frac{1}{2}$	2 $\frac{3}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{3}{16}$	2	1 $\frac{1}{2}$	1 $\frac{1}{4}$	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{8}$
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3	7 $\frac{3}{4}$	3 $\frac{1}{4}$	4 $\frac{1}{2}$	13 $\frac{1}{2}$	3 $\frac{1}{4}$	1 $\frac{3}{4}$	1 $\frac{3}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{3}{16}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$	2 $\frac{1}{4}$	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{8}$
10	9	3 $\frac{1}{2}$	5	15	3 $\frac{1}{2}$	2	2	$\frac{5}{16}$	1	$\frac{3}{16}$	3 $\frac{1}{4}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{8}$

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Every part save the body and tires constructed in our own factory; supervision of every detail and the closest inspection and test of the completed carriage supply the reason for its marvellous efficiency. Price \$750, F. O. B. Kenosha, Wis. "What Others Think" and Catalogue M-A mailed free on request.

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THE ORIENT RUNABOUT



MODEL 1902.

8 H. P.

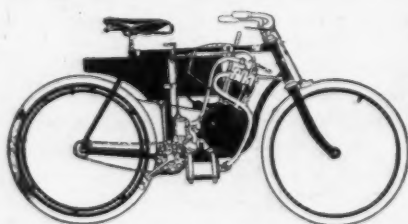
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\$250.00 Speed over 40 miles per hour.

The Most Powerful Motor Bicycle in the World.
Write for particulars. Agents wanted.

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VARNISH—ITS LOSS OF LUSTRE

Railroading Work Through the Shop to Meet Competition
is Generally Responsible

It not infrequently happens that carriages finished in apparently the most perfect style by the Napoleons of the varnish room will shortly thereafter lose surface lustre or "deadene." This may, and often does occur in the repository, or it may occur very early in its term of road service. This deadening, to use the phrase of the paint shop, represents a feature of malpractice, which finds support among painters, as a means of railroading work through the shop at high speed, in order to meet competition and go it one better.

The carriage owner or user, inexperienced in the ways of varnish, and all that pertains thereto, naturally heaps maledictions upon the varnish when loss of gloss manifests itself. A little investigation, however, should enable him to perceive that if a finishing varnish is possessed of sufficient quality to hold the full brilliancy of its coat to the maximum limit in one instance it should, other things being equal, do so in another. This being true, it becomes necessary to look to some prior cause for the trouble. Lack of uniformity in methods and mixtures is a prolific cause of the deviltry. Moreover, the most approved varnish under the manipulation of some workmen goes to a greasy smear upon the surface, whereas, the same varnish under the magic skill of still other workmen develops the full strength of a superb brilliancy. The marvelous lustre of varnish which the gossip of trade loves to picture depends in large degree upon the painter's skill in handling it under the brush.

Varnish belongs to a full set of the most sensitive commodities in the world, and it exacts of the user a skill fitly proportioned to the delicacy of its nature. Anything short of this, opens wide the door for the stealthy entrance of a troop of cloven hoofed marauders.

An insufficiently hard paint fabric is a strong cause of varnish deadening. When time is at a premium in the paint shop, a state of affairs usually scheduled for the spring months, and the general atmosphere of the shop is not equal to the work of oxidizing or hardening the paint as fast as the circumstances of the case suggest, then the process of crowding one coat of paint upon another, at the risk of "lifting" or softening up the preceding coat, is introduced. The direct and logical outcome of the process is "deadening" in all of its various and villainous forms. Varnish will have its lustre stolen often through the practice of using oil in the color coats. This practice should be obsolete, but, unfortunately, it is not, and by its observance the color coats do not dry as hard as the foundation upon which they are laid. Thus we have the lack of uniformity, previously noted. The roughstuff of to-day is almost invariably made up, in the matter of binder, of equal parts of coach, japan and rubbing varnish. To match this precisely the japan ground color should carry a first class rubbing varnish for a binder. This provides the required uniformity. Before varnishing

over it should be determined to a certainty that the color is dry through, not merely dry upon the surface. A color may be "set" so that it does not rub up under the brush, and still be far short of an absolutely dry state. To make sure beyond question that a color is perfectly dry before recoating with either color or varnish, is to stifle a red-handed imp of the varnish room.

A rubbing varnish should not be given a full measure of surfacing and then immediately coated upon. Better the custom of rubbing the varnish and setting the surface aside until the following day before finishing. Then give the surface an additional rubbing, concluding the process with what is known technically as water rubbing, i. e., rubbing with a clean pad or cloth dipped in water only. This re-rubbing immediately prior to finishing not only serves to put the surface into smoother and finer shape, but it also removes all rancid and greasy accumulations due to impure atmospheric conditions.

Granting the varnish to have been hard at the time of first rubbing, and equally so at the second process, little trouble need be anticipated from flattening of the finishing varnish. Not only skill in handling, but practical knowledge concerning the drying and other qualities of varnish, is essential to the development of all that counts for success in finishing. With a prophet's emphasis it should be indelibly fixed in the minds of every ambitious son of the varnish room, that rubbing varnish should be hard before surfacing. And every coat should be rubbed with water and pumice stone. The sleight of hand maneuvers with a fist full of trimmer's moss or cushion hair suffices merely to rasp the gloss off. It performs no office in the economy of surfacing, and fails even to furnish a safe surface to varnish over. On the other hand, cutting the varnish film with pumice stone and water, lays bare a new live surface, levels up inequalities, and promotes secure amalgamation of the successive coatings.

Deadening of varnish may come from stripping a coat of rubbing varnish through to the coat beneath during the process of rubbing. This method exposes a surface different in both kind and degree from that of the coat being surfaced; and almost any carriage finisher of experience is aware of the danger lurking in the wake of such incompetent workmanship. The proper surfacing of varnish is deserving of greater consideration than the flippant jugglers of felt pads and velvet sponges are ready to admit. A carefully and uniformly rubbed surface is to an important extent, at least, fortified against the ravages of flattening or deadening of the finishing varnish.—The Hub.

Up to Tuesday morning of this week twenty-three entries had been made for the endurance run of the Chicago Automobile Club, which takes place on Saturday of next week. R. H. Croninger, chairman of the committee, and Frank X. Mudd, went over the course last week in the latter's Winton, and established the controls. The road, taken all around, was in fairly good shape.



THE CYCLE AGE

New York, July 22 (Special telegram.) — Matters in connection with the management of the American Bicycle Co. have reached an interesting stage. Ever

since Col. Albert A. Pope and his associates secured control of sufficient of the company's stock, 2 or 3 months ago, to enable them to dictate its policy, it has been an open secret that Mr. Coleman would retire from the presidency at the end of his present term of office. It is said that he had stated that, come what may, he would not be a candidate for re-election. There are people connected with the company who think that, under these circumstances, he will retire before the annual meeting, which does not occur until October, for the reason that, having determined to quit business, it would be impossible that his heart should be in the work which he is so soon to turn over to a successor, especially as that successor is not of his own choosing.

The meeting of the board of directors held at the company's offices to-day was expected to be productive of interesting results. At its close, however, all of the members of the board were guarded in their remarks and would say nothing to the newspaper men, invariably referring them to Colonel George Pope. Evidently an understanding had been reached that the affairs of the company should be given no publicity except through the Pope interests.

The meeting adjourned subject to the call of the chairman. At its close Colonel George Pope was seen by a MOTOR AGE man and stated positively that there were no developments worth recording and that another meeting would probably be held within a fortnight. It is supposed that changes may occur at that time.

MORE RECORDS FOR CHAMPION

Winning a Four-Cornered Match he also Eclipses all Manhattan Beach Performances

New York, July 19.—Albert Champion again lowered all the Manhattan Beach records in a four-cornered motor paced match to-day against Butler, Hall and de Guichard, who finished behind him in this order. He rode the 20 miles in 29:32 1-5 and the third mile in 1:27 3-5, both of which are records for the track.

Hurley won by inches the 2 mile amateur open in

4:41 2-5 with Bellington second, Glasson third and Forrest fourth.

The amateur champion made a great ride in the half mile handicap, finishing a length behind Vandervier (55), who won in 59 1-5, with Dove (30) second, and Kohn (55) fourth.

RACE FOR MILE CHAMPIONSHIP

Kramer an Easy Winner—Batchelder Makes a Handicap and Produces Great Race

Atlantic City, July 19.—Frank Kramer won the one mile national championship at the Coliseum to-night, scoring thereby double points in the national circuit table. The sprinters drew a far larger crowd than any paced race has done yet at this track. Charles Klosterman, proprietor of the Washington and Baltimore tracks, assumes the management of the Coliseum this week.

Lawson was shut out in a semi-final and Bald in one of the trials. This left Kramer, Kimble, Fisher and Corlett in the final. The champion went out on the fourth lap of the seven lap track and it then became a mere play for his wheel. Kimble got it and the men finished in the order above given.

A. G. Batchelder, chairman of the board of control, former L. A. W. handicapper for New York, allotted the marks in the one mile handicap. The result proved that he had lost none of the cunning which created the memorable finish of the great Quill Club \$2,000 handicap; for Collett won from the 20 yard mark in the sensational time of 1:57.

THE CHAMPIONSHIP TABLE

Kramer Nearly Discounts all Other Candidates—Kimble Furnishes Surprise Party

New York, July 20.—Four grand circuit meets find Frank Kramer in the lead with twenty-five points. They were secured by four straight victories, the last one, the national mile championship, run at Atlantic City on Saturday, yielding double points.

The runner up is a gratifying and utter surprise in the person of "Old Kaintuck" Kimble, the veteran dean of the racing corps. The popular old fellow has won a place in the final of every race so far. His running second in the double point mile put him at the head of the bunch that is chasing the flying Kramer. The results of this same mile completely upset the table. Lawson failed to run and was forced down from second to

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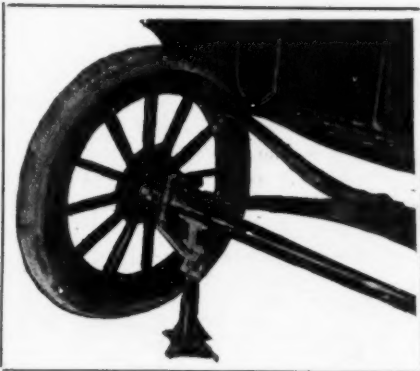
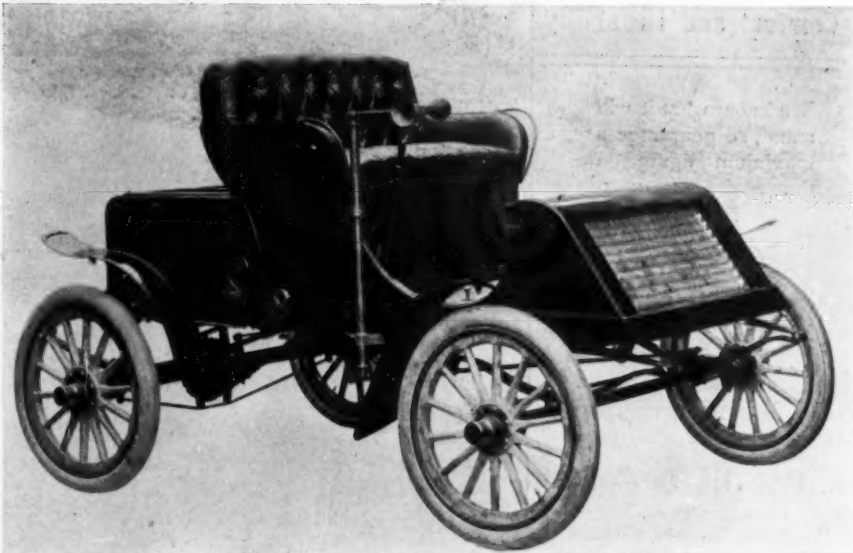
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Heavy Busses and Business Wagons built to order; some now under construction ::

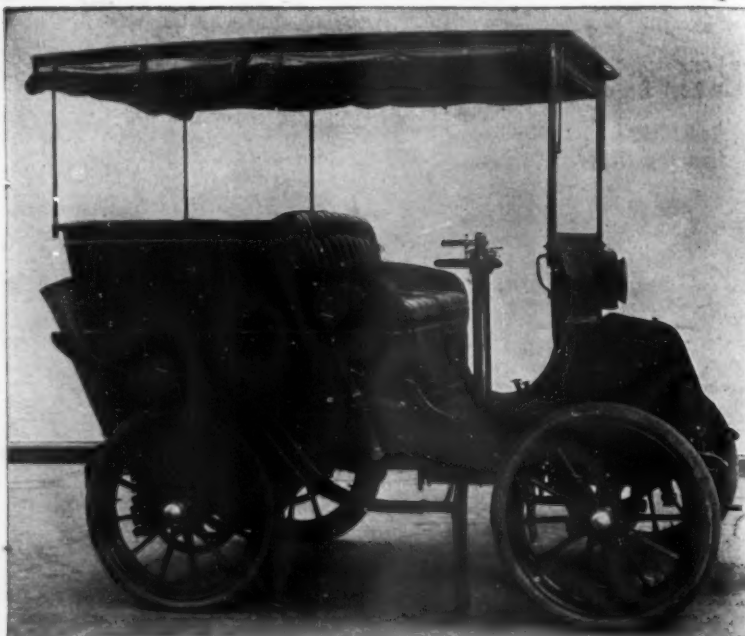
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fourth, being also passed by Collett, who got two points for finishing fourth. John T. Fisher, of Chicago, gained a fifth place in the championship table at one fell swoop by finishing third.

The circuit starts off with a hurrah. Big crowds were in attendance at Revere Beach, Providence and New Haven, where the first three of the championship meets were run. Only the bare results of the Atlantic City meet have been received at this writing. It is probable, however, that there was a large attendance as the races were a part of the L. A. W. meet programme.

On a basis of six points for first, three for second, two for third and one for fourth with double points for national championships, the contest up to the close of the Atlantic City meet stood:

	First.	Seconds.	Thir.	Fourths.	Points.
Kramer ..	4	0	0	0	25
Kimble ..	0	1	1	2	10
Collett ...	0	1	1	1	7
Lawson ...	0	2	0	0	6
Fisher	0	0	1	0	4
Bald	0	0	1	0	2
Wilson ..	0	0	0	1	1

Robl's Remarkable Record

After witnessing Robl ride in Paris some three seasons ago, we predicted a good time for him as a paced



Thaddeus Robl.

specialist, and he has fully confirmed our opinion, says the Cyclist. Last season Robl came right to the front, winning the 100 kiloms. world's championship, beating

the world's hour record, and winning the only 24 hours' race of the year. Therefore he was expected to rank as champion this season, more particularly so, seeing that he takes great care of himself. Moreover, he can stand plenty of hard work and takes keen interest in getting himself into proper shape, not shirking any of the monotonies of training life. Thaddeus was not successful the first time of asking, owing to the old trouble (pacing), but, being well provided for in this direction, in the second stages of the 2 days' race at the Parc des Princes Track, Paris, on April 20, he lifted the world's hour record up to 41 miles 1,514 yards, beating all records from 20 to 80 kiloms., Dickentmann being the ultimate winner on aggregate scoring. His next win was registered on the 13th of May, at the same track, when he beat Linton and others in an hour paced race, covering the remarkable distance of 45 miles 166 yards in the hour, which at present stands as world's best for the 60 minutes. A few days later he beat Linton and Bouhours in an hour's paced race at the new Buffalo Velodrome. On the 25th of May he won the Golden Wheel of Berlin, over 100 kiloms., in the world's record time of 1 h. 28 min. 19.2-5 sec., Dickentmann, Ryser, Bouhours and Linton finishing behind him. June 1 saw him again victorious, this time at Leipzig, where he beat the above named cracks (bar Linton, who was riding at Paris) in an hour's paced race.

Test of Speed and Economy

New York, July 20.—A novel motor cycle economy and speed test is to be run at Manhattan Beach bicycle track on August 9. It will be at 50 miles and is promoted by the New York Motor Cycle Club. Prizes will be awarded not only to the leaders from a racing standpoint, but to the contestants whose machines show the greatest economy in fuel consumption. The race will be started at 1 o'clock and precede the N. C. A. circuit meet and the four cornered motor paced race also scheduled for that day on the track.

R. M. Owen, manager of the Oldsmobile Co., New York, has returned from a tour of the state agencies.

George F. Chamberlin, former chairman of the A. C. A. law committee, has bought a White steamer.

Motor Cycle Club for Philadelphia

Philadelphia, Pa., July 19.—Motor cyclists in this city are endeavoring to form a club for the advancement of the sport. A number of those interested met at the residence of Walter Driver, southwest corner of Seventh street and Lehigh avenue. It was decided to hold another meeting. Officers will be elected and an organization formed. All owners of motor cycles are invited to be present. It is proposed to hold a club run of not less than 50 miles every Sunday during the riding season.

There are about 100 riders of the motor cycle in this city, and it is hoped by the projectors of the new organization that nearly all of them will join. Although the principal object of the new club is the sport and

pleasure of the members, the organization will use its influence toward securing favorable legislation and in other ways protect the interests of motor cyclists.

Huber Wins from Rutt and Ellegaard

It is all Grand Prix just now in Paris. The Grand Prix of Boulogne with 1,000 francs to the winner, attracted a bunch of cracks to the Princess track on the 6th. The heats had been won by Ellegaard, Domain, Rutt, Momo, Huber, Vanden Born and Jacquelin, and the consolation by Gentel. The three semi-finals were won by Rutt, Huber, who beat Jacquelin, and Ellegaard. Huber's great riding was unexpected for he had not been heard from for months. The three riders traveled slowly until the bell rang. Huber started the sprint. Along the stretch they came, little Rutt swinging somewhat in his effort, but Huber took a small margin and crossed the tape the winner by a little less than half a wheel, while Rutt stole second place.

Another fine race was the tandem event, which ended in the victory of Ellegaard-Arend. Huber-Seidl were second by inches.

In the second scratch race Arend, Seidl, Bixio, Jacquelin entered. The final was won by Jacquelin, from Schilling, Dutch, and Bixio, Italian. The former champion of France was given a noisy reception. The 10 kilometers motor bicycle race was captured by Rigal in 8:03 2-5. Lamberjack was second 250 meters behind, Demester third by a wheel and Denesle was fourth, also by a wheel, a close finish between the last three named.

Newark, N. J., July 20.—Six thousand people saw the professionals and amateurs in distinctive team races at Vailsburg today. The money chasers raced in pairs at a mile in three trial heats and a final. The latter was an easy win for Kramer, who was dropped into a safe lead by Corlett. Fenn and Leander finished second. Martin and Fred Beauchamp took third place after beating out Bald and Wilson in the trial.

The amateur pursuit race for inter-city teams went to these sturdy Newark pluggers, Glasson and Schlee, with Billington and Zanes second, and Gouke and Cameron third. Time 5:47. Distance 2½ miles. Hurley had no mate and did not start.

George Schreiber (120) made a dashing win of the two-mile "pro" handicap in 4:00, with Floyd Krebs (120) second, John Bedell (60) third and Jed Newkirk (150) fourth.

The amateur mile handicap went to Cameron (120) in 1:59 2-5, with Pinn (140) second, Hollister (80) third and Kiendl (120) fourth.

Movements of Retail Dealers

DES MOINES, IOWA.—Harrah & Stewart Mfg. Co. take over the entire wholesale stock of bicycle sundries, tires and supplies of the former Warfield-Chase Co. Harrah & Stewart are exclusively wholesalers in this line, enjoying an extensive and growing business throughout the entire western and southwestern states. This business was established in Des Moines in April, 1897. This sale leaves but one exclusively wholesale bicycle supply house in Iowa.

The following new cycle stores and repair shops are re-

ported: Carl Searles, Coeur d'Alene, Idaho; Gustaf Haggberg, Worcester, Mass.; John Hand, Whitesboro, N. Y.; W. W. Wheaton, Leslie, Mich.; Samuel Pickels, Marshall, Mich.; George Thomas, Mount Pleasant, Iowa; Krause Bros., Java, S. D.; Charles W. Cornwell, Marsall, Ill.; Carson & Smith, Edgerton, Minn.; P. M. Cassidy, New Milford, Conn.; E. R. Davis, Rockland, Me.

LEAVENWORTH, KAN.—Tholen Bros. have purchased the entire stock of bicycles and sundries from the Leavenworth Cycle Co. The stock will be moved to Tholen Bros.' store. Tholen Bros. will retain the agencies for the various brands of wheels handled by the Leavenworth Cycle Co. and this will make them the only firm in the city selling bicycles.

ROCKLAND, ME.—The bicycle shop of E. R. Davis was damaged by fire and valuable machinery and bicycles were rendered practically worthless. The loss on the building is about \$2,500; insured for \$1,000. Mr. Davis' loss amounts to \$800; insured for \$500.

SALINA, KAN.—Richard J. Thomson has purchased the old Fred Miner bicycle shop and intends removing to that location next week, as he has not enough room in his present quarters.

BRISTOL, R. I.—William H. Hood, of Providence, has opened a bicycle repair shop and has the agency for the well known Racycle and other sporting goods.

TACOMA, WASH.—Erving Peterson has purchased the bicycle stock and repair business of Mr. Baum and is continuing the line of work in the same building.

HOMER, MICH.—Francis VanHorne has bought out H. A. Bottomley's interest in the Sophia street bicycle works and will conduct the business hereafter.

DAVENPORT, IOWA.—Arthur G. Francis, bicycle dealer, has gone into voluntary bankruptcy. He schedules liabilities of \$1,700 and assets of \$5,000.

POMONA, CAL.—A. M. Trundy has sold his interest in the Cleveland Cyclery to C. L. Thomas, who will move his family from Los Angeles.

RUMFORD FALLS, ME.—Lee Abbott has purchased the bicycle business of J. E. Stephens and will take possession at once.

SPOKANE, WASH.—Graham & Hayes have purchased the bicycle business of A. B. Freeman and Wakely Bros.

OXFORD, MASS.—Herbert B. Gates has bought out Frank S. Clark's bicycle repair shop.

BLACKFOOT, IDAHO.—Frank Rickens has succeeded Rickens & Peery, cycles and sundries.

Taylor Joins Circuit This Week

New York, July 21.—Word was received at N. C. A. headquarters this morning from the Iver Johnson Cycle and Arms Co., whose bicycle Major Taylor rides, that the colored crack would join the national circuit at Washington on Wednesday.

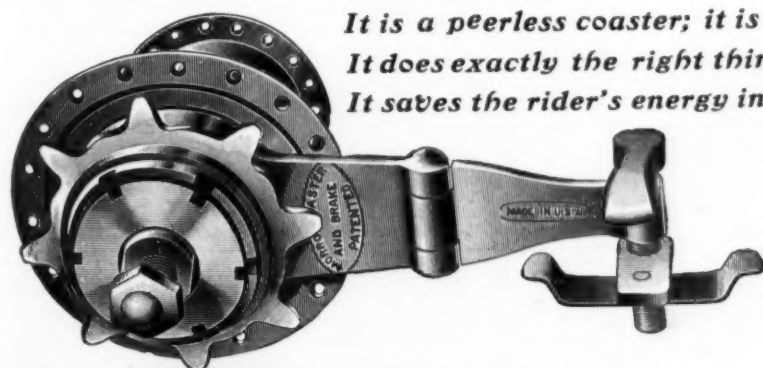
The New York Mail and Express has issued a very complete motor vehicle record book. The fact that it is the compilation of Alfred Reeves, secretary of the National Cycling Association Board of Control, who is the Mail and Express automobile editor, is an assurance of the completeness of the records and the painstaking thoroughness of their investigation before issuance. The paper and the editor are deserving of the thanks of the fraternity for their handy and valuable little volume.

W. K. Vanderbilt, Jr., has bought the Renault vehicle which won the Paris-Vienna race. Mr. Vanderbilt will return to New York in a few days.

A cablegram from London says that an American company is to place an electric bus service in operation there and in Paris and that hub motors will be used.

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*It is a peerless coaster; it is a peerless brake.
It does exactly the right thing in exactly the right way.
It saves the rider's energy in coasting or in braking.*

As a brake it takes hold quickly but not violently; the slightest application retards the wheel's momentum and once applied, it does not require hard and continuous and energy-consuming back-peddalling pressure to keep it applied. It does not depend

on the heat generated by the friction of metal against metal for its effective operation.

The Morrow is the result not of a few months' limited experience but of several years' use in all parts of the world by all kinds and conditions of men. It is no experiment.

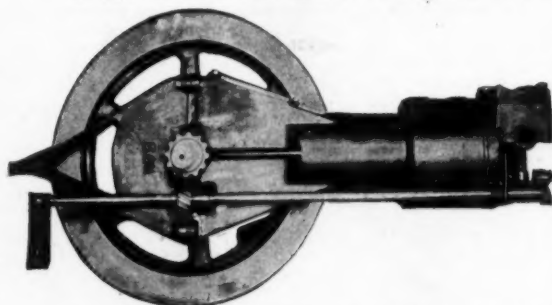
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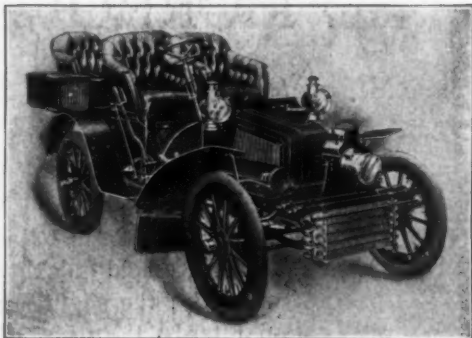
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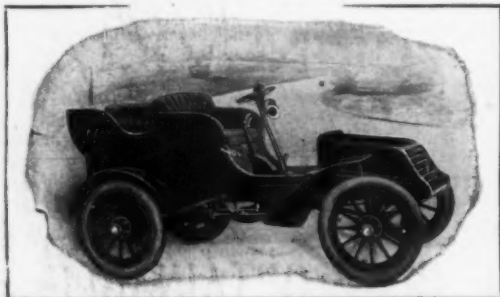
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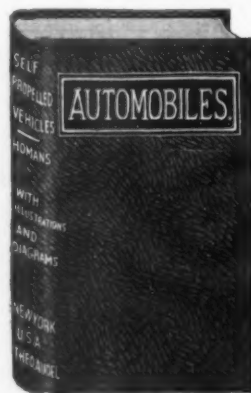
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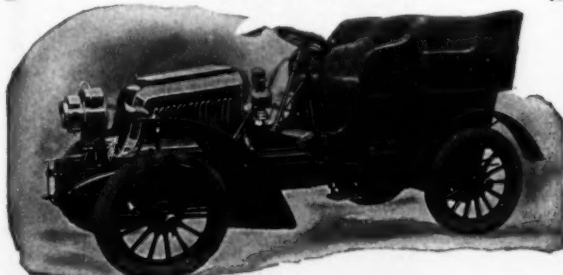
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TWO trips without penalized stops
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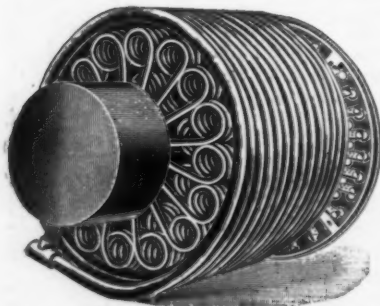
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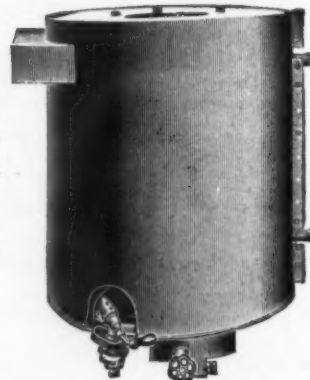
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WE HAVE INCREASED OUR FACILITIES AND
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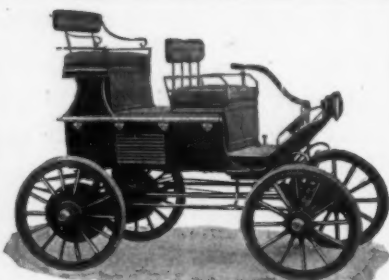
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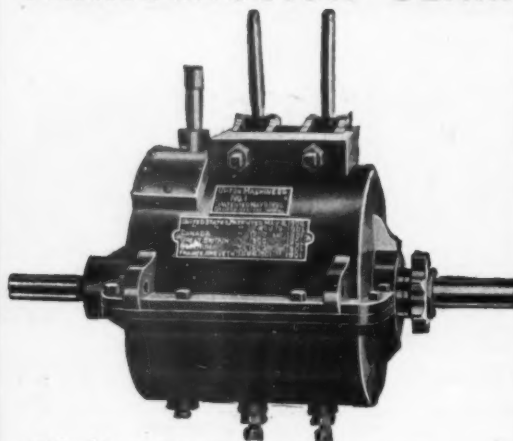
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WE DO NOT OFFER YOU AN AUTOMOBILE
on the merits of a special vehicle constructed for the sole purpose of entering any special contest.

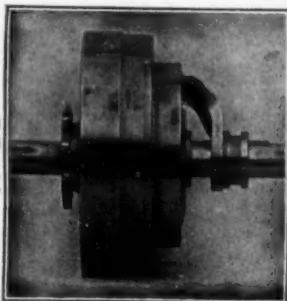
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These achievements were done with stock products exclusively, and all but one were borrowed from customers after months of amateur use.

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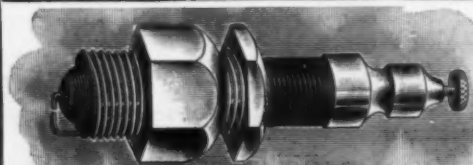
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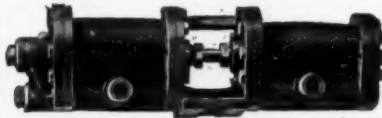
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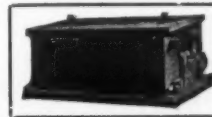
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Water Cooled. For Automobiles, Launches and Stationary use. From 1 to 150 Horse Power.

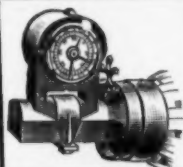
Also AUTOMOBILES of Every Style
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Registers up to sixteen hundred miles and repeats. Thousands in use. Warranted in every particular. Send for descriptive circular.

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DIXON CRUCIBLE COMPANY, Jersey City, N. J.

Gas Engine Igniters

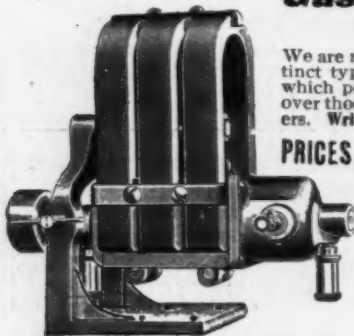
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PRICES \$12.00 TO \$15.00

Adapted to Marine, Automobile and Stationary Engines.

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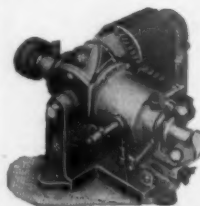
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THROUGH FULLMAN SERVICE
BETWEEN CHICAGO AND

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GENERAL PASSENGER AGENT,
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To Owners of Gasoline Engines,
Automobiles, Launches, Etc.
The Auto-Sparker

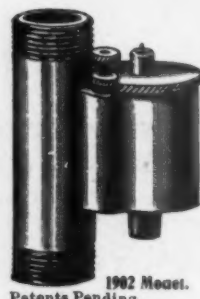
does away entirely with all starting and running batteries, their annoyance and expense. No belt—no switch—no batteries. Can be attached to any engine now using batteries. Fully guaranteed; write for descriptive catalog.

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THE KINGSTON NOISELESS AUTOMATIC CARBURETER.

If you have a gasoline engine that troubles you, or a gas engine that you wish to convert into a gasoline engine you need this Carbureter, the only reliable system for automobile or bicycle motors. Will stand any amount of vibration, is noiseless, light; no valves in motion when once adjusted to an engine; never needs to be shut off or changed.

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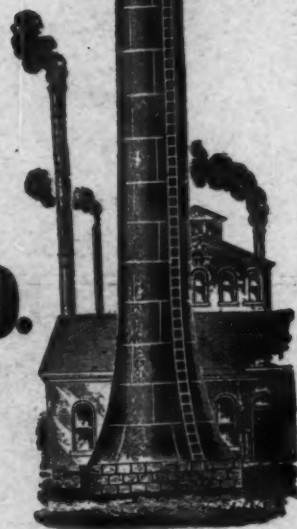
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Patents Pending.

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Solid and
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